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STEEL

The Magazine of Metalworking and Metalproducing

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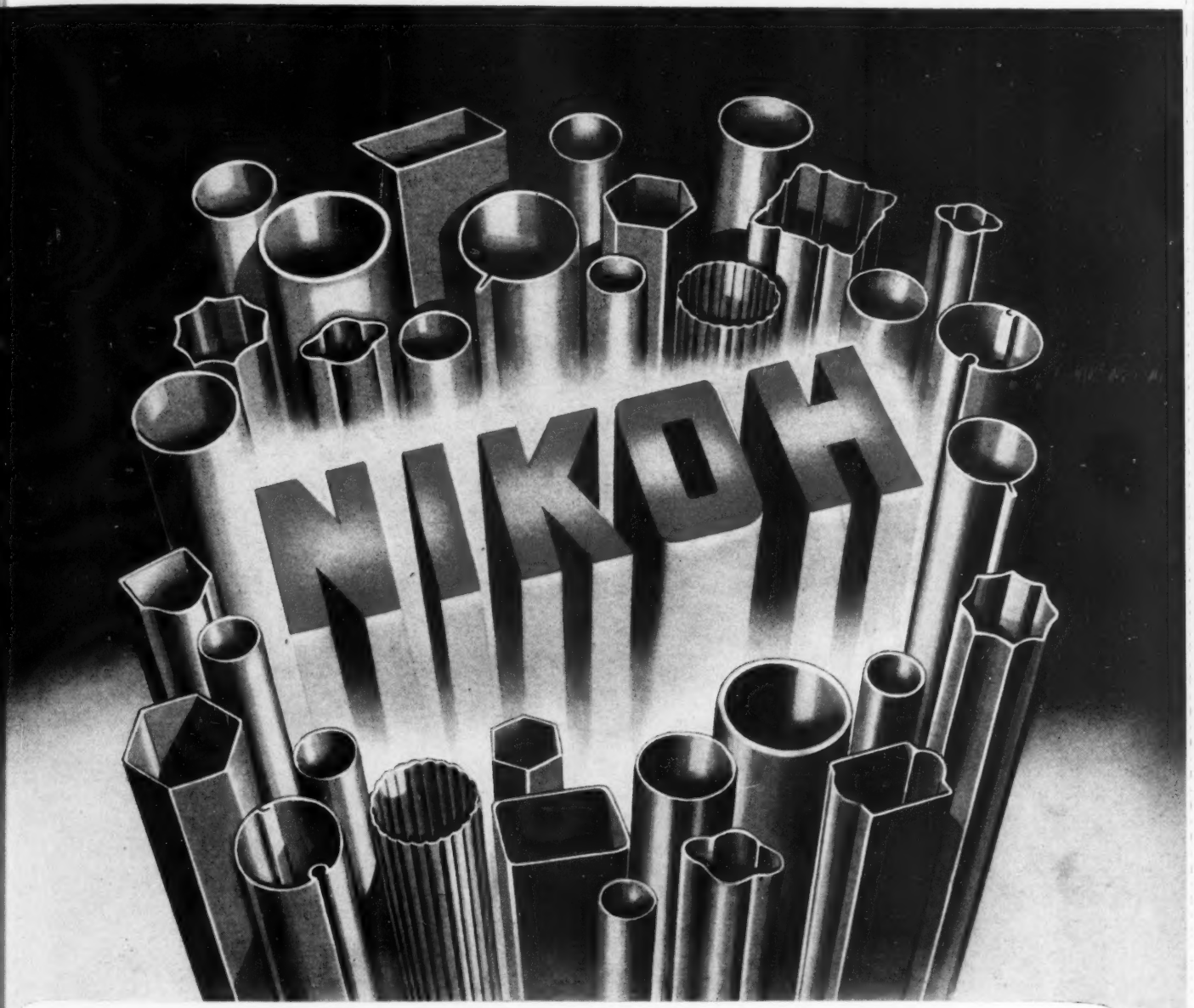

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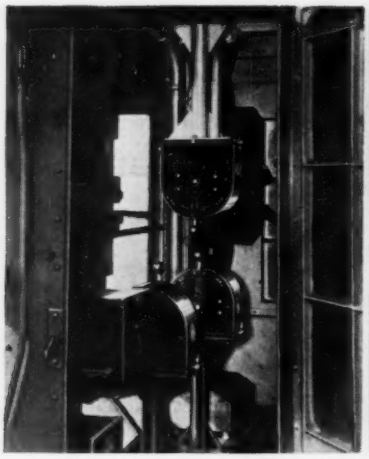
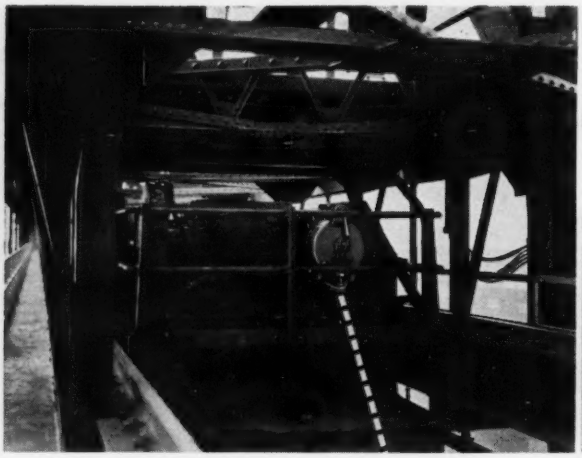
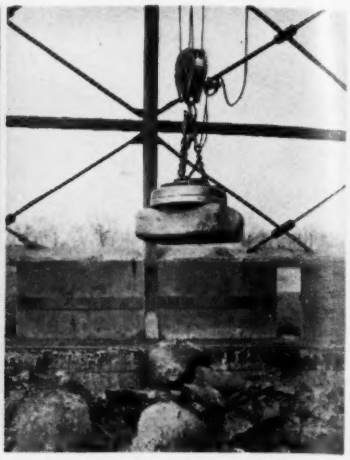


ON THE ORE BRIDGE

Interior view of the operator's cab, showing EC&M Cam-type Master Switches.



Close-up of the ore bridge trolley, showing one of four EC&M No. 60 Type WB Brakes.



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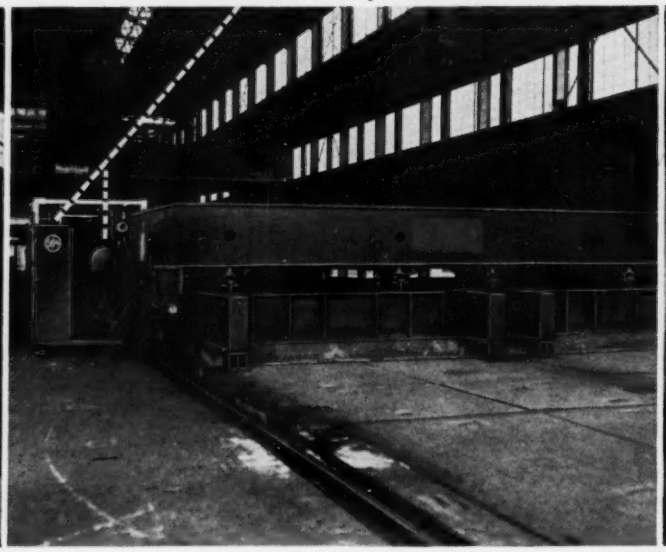
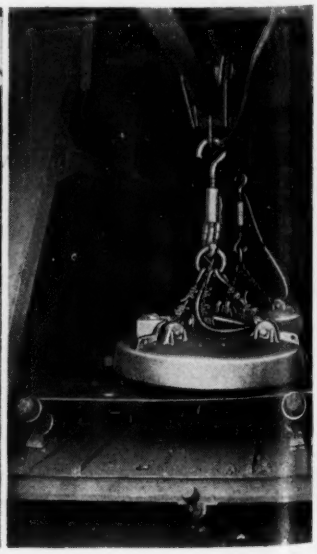


AT THE COKE PLANT

Two No. 4 Type SW Separator Magnets remove tramp iron from coal conveyor belts.



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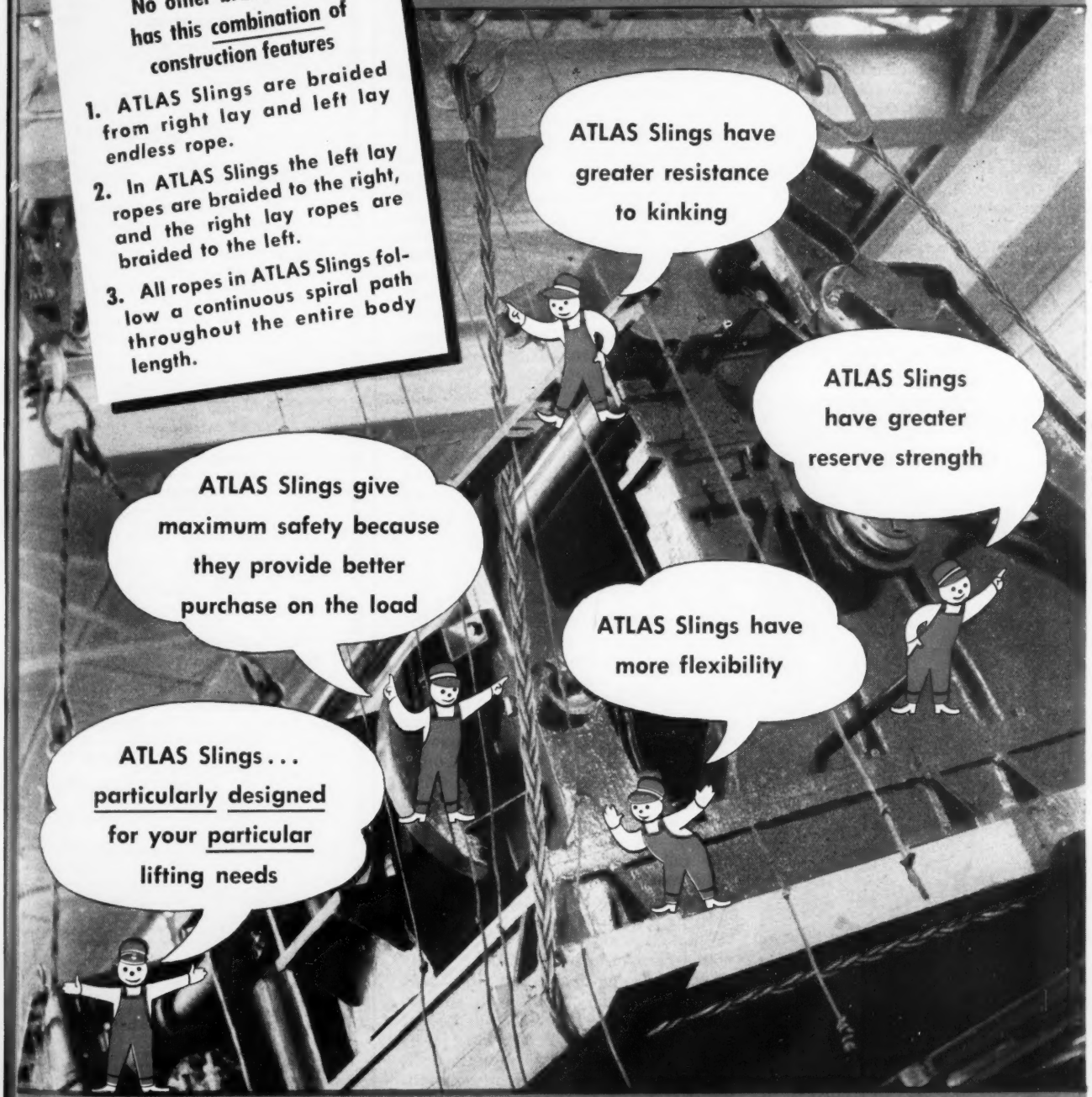
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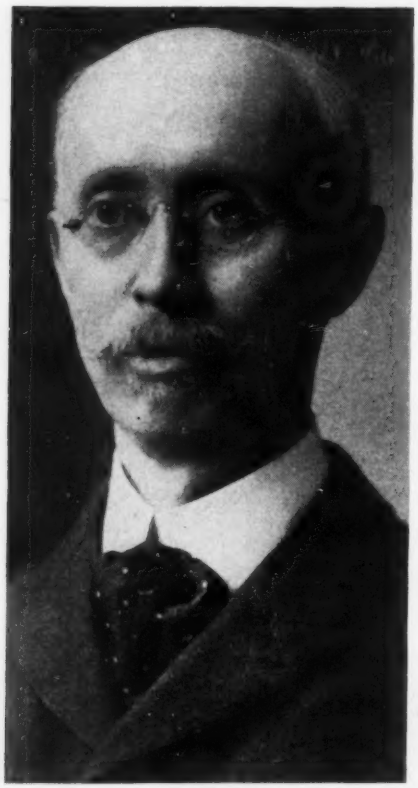
Behind the Scenes...

The Original Editor

Staring you right in the face from this column is our Founder. His name was (or is?) Wilson Miles Day, and way back in 1882 he founded, was the head editor and first publisher of the Iron Trade Review and Western Machinist. He was only 32 at the time, but he had already made a name for himself in Cleveland. At 27 he started the Cleveland Printing and Publishing Co., which was the first printer of this magazine. Mr. Day became a civic leader, headed the Cleveland Chamber of Commerce and was Director-General of the Cleveland Centennial of 1896. He was also in the metalworking business, as treasurer of the National Safe & Lock Co., and had many other civic and business interests. This photograph



turned up the other day, reminded us that we had no information of the instigator of this sheet, so we are putting him in print for all to see. Now that this item has been run, we'll have something in our files, to drag out a year from this September when we celebrate the 100th anniversary of his birth!

Back Fifty Years

Our old friend W. Trinks, affectionately known to several generations of Carnegie Tech students as well as steel industry engineers as "Pop", points out that we should probably retain him as a consulting engineer on our Department of Fifty Years Ago. His sharp eyes caught the typographical error of a couple of weeks back, where we said 1889 was a half century back. This week we will be sure to point out that it was our issue of April 27, 1899, not 1889, which burst wide open with excitement. Rumors, according to our editors, were flying around and the trade was buzzing. Looking back over 50 years, it is easy to catch the infectious excitement of that issue. The tales, if true, were tremendous. They involved nearly all the giant consolidations which had been building up over the preceding two years, and also the Carnegie Steel Co., the giant independent which was the recognized leader of the industry. The buzzing in steel company offices, in clubs, on trains, and wherever else steel men met must have been tremendous. We'd like to have been around at the time, as a reporter on this paper, so we could have joined in the guessing.

Puzzle Corner

If you are still confused about the age of Ann, you're not in an original state. You're only copying millions before you. However, if you have analyzed the problem, which is deliberately stated in a confusing manner, you may have some answers which you'd like to check with ours. We have the age of Ann as 16½, that of Mary as 27½. This seems to check out, and was obtained by setting up successive equations in five unknowns, following the conditions in the problem. We'll be glad to send along our equations if you'd drop us a note. Since the girls seem to make good subjects for puzzles, how about this one: When Sally went to the voting booth, the clerk asked her age. "Eighteen", she replied. The clerk frowned, looked at her, and asked, "You don't really mean it, do you?" "Of course not," replied Sally, "I gave myself the benefit of a year less than a quarter of my real age." The clerk permitted her to vote, but he was still a little doubtful as to her real age. Can you help him out?

Shrdlu

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STEEL

Vol. 124—No. 17 April 25, 1949

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Efficient Handling Methods Can Cut Production Costs

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STEEL

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RM-14

April 25, 1949

Before It Is Too Late!

Three separate items in this issue, when considered in relation to each other, spell out a situation which warrants the special attention of everyone who has a stake in the future of our country.

According to the first item, suppliers to the automobile industry report that their customers are increasing their pressure for lower prices. This means that henceforth sellers must exert every possible effort to keep costs down if they are to stay in business.

The second item comes from Washington. It shows the huge appropriations for federal expenses which the House has approved for the fiscal year 1950. The figures prove conclusively that the 81st Congress is not economy-minded It is spending money like drunken sailors.

Putting together the implications of Items 1 and 2, we have the spectacle of industrial corporations working their heads off to save a few cents in the selling price of their product while the public's representatives in Washington are appropriating hundreds of millions of dollars which will be frittered away on activities the nation cannot afford.

This brings us to Item 3. In 1948 the net income of 28 leading steel companies was $526,259,173. These companies set aside $376,480,184 for federal income taxes. If the state, local and other taxes assessed against these companies were in the same proportion as those borne by United States Steel Corp., then these 28 companies were subject to an additional tax burden of $202,-510,000.

This means that on the average, a steel company operated from Jan. 1 until May 4 last year to earn enough to pay its income tax to the federal government and then worked from May 5 to July 10 to earn enough for state, local and other taxes. There remained earnings for five months and 21 days which it could use for its own purposes. Likewise, many executives responsible for the management of these companies worked well into the third quarter before they had earned enough to pay their taxes.

Public complacency regarding this intolerable situation is appalling. The low-income fellow who thinks the rich are footing the bill doesn't realize he is being gypped through invisible taxes. It remains for those who know the score to demand economy—before it is too late.

* * *

DIFFICULT DAYS AHEAD: A quick glance at the calendar of labor union contract negotiations shows that starting next week and continuing throughout the year scores of companies in the metalworking industries will be busily engaged in working out new contracts.

Preliminary statements by union leaders indicate that the unions will ask for higher wages, based on the argument that the profits of most companies are sufficient to absorb increased hourly rates, and for a broad social insurance program covering life insurance, sickness and disability benefits and hospitalization for employees and families to be paid by the companies. The matter of pensions also probably will be introduced.

One difficulty to be expected in these negotiations is the difference in economic viewpoints of the negotiators. The union men come to the bargaining table with the conviction that this nation is fully committed to a "full employment" economy. The employers come to the table with the feeling that while the government presumably has adopted "full employment" policies, the responsibility for keeping a company solvent and able to pay wages and benefits still rests

(OVER)

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AS THE EDITOR VIEWS THE NEWS

with the company management. The employers are forced to proceed on the assumption that there will continue to be ups and downs in the business cycle. The unions base their demands on industry's earnings in a sellers' market. They discount the reduction of earnings that will be inevitable in the adjustment to a buyers' market. —p. 52

* * *

STEEL ON THE HIGHWAY: A mild revolution in transportation is underway in the metalworking industries. Since 1940 the number of Class I motor vehicle carriers which are subject to Interstate Commerce Commission regulations has doubled. Reports from various industrial areas show that the tonnage of steel and metal products moved by highway truckers has increased around 30 per cent during the past year.

This pronounced shift from rail to highway transit is attributable to a number of factors. One is increased rail freight rates. Another is mill pricing. A third is the convenience of truck shipments in terms of time and manner of bundling or crating.

The sharp increase in motor truck shipments accentuates regulatory problems. Many states are tightening load-weight restrictions at the same time truckers are asking for more liberal allowances. In some sections the highway hazard introduced by moving steel at high speeds is being debated vigorously.

Steel shippers may be called upon shortly to add trucking problems to their agenda of public relations activities. —p. 51

* * *

COMMUNITY RELATIONS: Allegheny Ludlum Steel Corp. is one of the growing number of industrial companies which believes in fostering better community relations. Last week its executives held meetings in Leechburg and Brackenridge, Pa., and Dunkirk and Watervliet, N. Y., to afford citizens in these communities an opportunity to become better informed as to its policies.

Probably it is significant that many of the questions asked by towns-people had to do with the business outlook. Professional men, educators, merchants and churchmen inquired about the ability of the corporation to weather a recession. The logical answer was to reveal the corporation's research and marketing plans and to exhibit new products which it hopes will broaden the market for its wares. Also significant were questions from local citizens as to how they might help the company in connection with some of its problems.

This idea of cultivating community interest is worthwhile. Properly executed on the basis of absolute sincerity it pays handsome dividends. —p. 56

* * *

DON'T SELL U. S. SHORT: It is amazing how consistently experts have underestimated the growth of the market for automobiles.

In 1904 leading bankers were warning the nation that the motor car industry was overexpanded. In 1908 a New York investment house declared the industry was nearing the point of maximum development. Later one expert predicted that the nation could not use more than 12 million cars. Still later an eminent bank economist revised the top limit to 20 million. In more recent years various authorities have constructed trend lines to show the estimated number of cars in use in future years. In every instance the predictions have fallen far short of the actual situation. Today about 41 million cars, trucks and busses are in operation.

If there is a moral to this experience it is the warning repeated frequently by the late Arthur Brisbane—"Don't sell America short!" —p. 66

* * *

A NEW ATTACK ON RUST: Knowing that corrosion of iron and steel exacts a toll of at least $2 billion annually, metallurgists, engineers and others wage a constant battle to find ways of extending the life of ferrous metals. Special alloys, metallic and mechanical coatings and surface impregnation are the principal methods employed.

The remedies which are most effective are costly and those which are economical afford effective protection for too short a time. Thus the search narrows down to a remedy that provides protection for a fairly long period at reasonable cost.

Attention now is being focused upon a liquid zinc-content coating which can be applied to steel in the same manner as paint. It has been in limited commercial production for two years and exhaustive tests indicate that a single application may provide protection for 20 years. This makes it a development well worth watching. —p. 80

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

TRUCK VS. TRAIN—Motor carriers are hauling a larger share of steel and metalworking goods and the railroads are carrying proportionately less (p. 51). During the first two months of this year trucks carried about a third more steel than they carried in the corresponding period last year. The shift toward highway transportation is attributed to the lower cost of truck shipments in some instances, to increased speed of deliveries and to greater convenience to the buyer. Where the buyer pays the freight, he is more likely to insist on truck shipments. Most steel mills have about reached the limit of truck loading capacity at their plants.

BUSINESS WEATHER—Industry is getting into training for competitive markets ahead (p. 54). Price reductions continue to be made on a variety of metalworking items. Pressure is being exerted on suppliers of parts and materials to shave prices. Premiums have about disappeared. Freight absorption is reappearing in greater volume. Closer attention is being paid to costs.

SCRAP— The demoralized scrap market, recognized in these pages for weeks, is receiving widespread public recognition (p. 56). The Chicago scrap industry in paid newspaper advertisements warns that the time may be approaching when dealers will be unable to pay metalworking companies for material taken from their plants, due to the disappearance of an open market for scrap. Meanwhile, the larger users remain out of the market, depending on inventories acquired earlier and on more hot metal produced in their own blast furnaces.

FOURTH ROUND— United Steelworkers will meet in Pittsburgh next week to formulate detailed demands to be presented to basic steel producers at wage negotiations this summer (p. 52). These demands are expected to emphasize welfare issues, although demand for straight wage increases will be made, according to union officials. Leading industrialists doubt that any wage increase will be granted, believe concessions will be limited to fringe adjustments. Negotiations between Ford and the United Auto Workers, to start May 15 (p. 65), will be watched by metalworking companies with interest.

"SPEND AND SPEND"— Protests by businessmen against the free and easy spending policy of the national administration and the Congress are receiving scant attention in Washington. This is not an economy-minded administration. The trend toward bigger, costlier government continues.

AUTOS OF TOMORROW— Consulting Engineer Robert B. Walder sees the auto industry heading into a competitive struggle that will bring out a wave of improvements in passenger cars (p. 65). Styling will be simplified. Automatic transmissions will become universal. Cylinder displacement will be reduced, bettering gasoline mileage and maintaining power. Four-cylinder engines will become popular in medium-size cars.

EUROPE—Decisions by the Western powers on future industrial production to be permitted in Germany have cleared the way for Europe's capital expansion planning (p. 63). The higher ceilings on production to be permitted have brought a wave of optimism to Germany, although tempered by realization that new plant and equipment will be necessary to achieve the new goals. Elsewhere in Europe, plant expansions, aided by ECA funds, are going forward.

HERE AND THERE IN INDUSTRY—Resistance Welding Institute, with headquarters at Cleveland, has been organized to disseminate information on technical advances in the industry (p. 69) . . . Columbia Steel Co. will discontinue commercial foundry operations at Pittsburg, Calif. (p. 68) . . . Studebaker has designed a new military truck (p. 66) . . . A public works program is being planned by the government, to be launched when economic conditions dictate (p. 62). . . . Co-operatives now are trying to get into the steel capacity expansion act; they say they even are considering buying a steel mill (p. 60) . . . A series of community meetings to explain its activities was staged by Allegheny Ludlum Steel Corp. (p.56) . . . Machine tool orders in March turned upward (p. 55).

Engineering News, p. 79 *Market Summary, p. 137*

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More Steel Moves on Highways

Trucks carrying greater percentage of freight. Rates often cheaper than those of railroads. Buyers, who pay the tariff, want speed and convenience of motor carrier shipments

A MINOR revolution is taking place in the movement of steel and metalworking freight. Truckers are carrying a larger share. The railroads are carrying proportionately less, especially in l.c.l. shipments.

The trend toward truck shipment is accelerating.

Lower cost, more prompt service and convenience to the buyer, who now pays the freight, are major factors in the shift to motor carriers.

The tonnage of steel and metalworking goods carried by rail, of course, still dwarfs that carried by trucks. But the railroads are feeling the inroads of truck competition.

Motor Carriers Double—Since 1940, the number of Class 1 motor carriers (those having annual revenues of $100,000 or more and who are subject to Interstate Commerce Commission regulations) has doubled. The number for each year, as compiled by the American Trucking Associations Inc., Washington, is as follows:

1940	1202	1944	1824
1941	1301	1945	2001
1942	1443	1946	2099
1943	1578	1947	2211
		1948	2400

This boom in the motor truck business reflects not only the increased tonnages of steel and other hard goods carried but also an increase in highway transportation of other types of commodities.

Pricing Change Factor—Trend toward truck shipments of steel received a fillip last summer when the steel industry abandoned its historic basing point pricing system in favor of f.o.b. mill pricing. When the customer started paying the freight, he began to insist on truck shipments. Costs often were lower than rail shipments and truck deliveries to his plant were more convenient, particularly where he lacked a railway spur.

In January of this year, Class 1 truck carriers handled 28.9 per cent more steel than in January, 1948, and in February steel hauled by trucks was 36.7 per cent greater than the same month a year ago.

Steel mills note that each increase in rail freight rates is followed by an upsurge in customer demands for shipment by truck.

Cost Often Lower—On some hauls, truck rates are substantially below rail rates, although an overall comparison is difficult. One large steel producer with mills in the Pittsburgh area and in the East recently compiled a comparison of truck and rail rates from Pittsburgh to Cincinnati. The l.c.l. rail rate was 85.6 cents per hundred pounds and the carload rate was 50.22 cents. Truck rates on shipments up to 5000 pounds were 95.79 cents; from 5000 to 20,000 pounds, 74.16 cents; and from 20,000 pounds up, 41.20 cents. Thus, except on small quantities, truck rates represented a decided saving in transportation costs to the buyer.

Comparison of rates doesn't tell the whole story. Off-track buyers have to consider the cost of handling steel from cars to trucks to get the material into their plants.

Some metalworking companies find the one-haul service offered by trucks, without necessity of transshipment from plant to rail terminal or from rail terminal to point of destination, more economical than rail shipment. Often, less expensive crating is necessary from truck shipments.

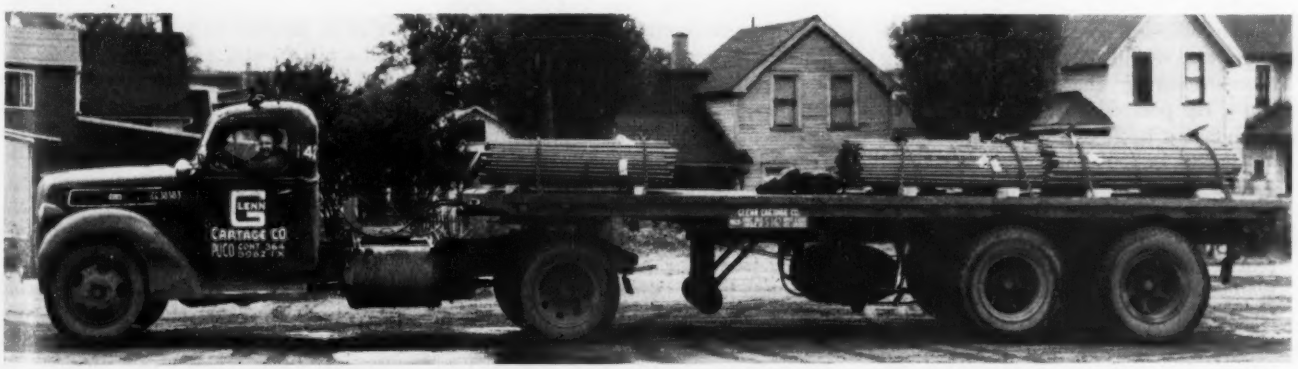
How Much by Truck?—Exact amount of steel shipped by individual plants generally is a closely guarded secret. However, truck shipments from Chicago district mills last month are estimated at 196,500 tons, or about 16.5 per cent of total shipments of 1,190,000 tons of finished steel. Last June, truck shipments amounted to 153,000 tons, 14.3 per cent of the total.

On the West Coast the use of trucks in shipping steel has approximately doubled during the past year, and the trend is accelerating. Truckers have a distinct rate advantage in l.c.l. shipments. One company which receives large shipments from the East by water, uses trucks to transship 70 per cent of this material to consuming plants in California.

St. Louis reports 80 per cent more steel is being shipped by truck now than a year ago. Barge deliveries also have increased. Of the total tonnage moved from this center, it is estimated 30 per cent goes by truck, 20 per cent by water and 50 per cent by rail. A year ago, 70 per cent of the total was moved by rail.

Cincinnati area mills say three times as much steel now is moved by truck as before the war.

Eastern mills report wide varia-



Steel bars move by tractor-trailer from mill to consuming plant

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tions in tonnages moved by truck. One large producer says that not more than 1 per cent goes over the highways.

Truck movement from various other eastern mills ranges from 5 to 20 per cent. In scattered instances the ratio is even higher, and one producer estimates truck shipments amount to from 30 to 60 per cent of the total from its various plants.

Pittsburgh mills note that truck shipments over the past year have increased from about 20 to 35 per cent.

Loading Is Problem—Some mills believe the practical limit in truck shipments is being approached because the mills do not have sufficient loading docks to accommodate trucks, and the physical layout at many mills does not permit the construction of new truck loading facilities. In Chicago, for example, truck-loading facilities now are being used to the maximum and only one plant of one mill is in a position to handle more truck traffic.

Few steel mills were laid out with substantial truck shipping in mind.

Highway Problem—Maximum load laws, which vary from state to state, pose another problem for the trucking companies. Highway authorities recently have been increasing vigilance against overloading. In Illinois, 6000 trucks recently were summoned in one day for overloading.

Checks on the Pennsylvania-New York border recently revealed that many motor carriers with loads exceeding the legal limit were carrying steel.

In Pennsylvania, trucking companies and steel shippers are trying to obtain passage of a bill to raise the loaded truck weight limit in that state. A bill to authorize an increase from 45,000 to 48,000 pounds in the maximum weight of a loaded vehicle of the single unit type and an increase from 45,000 to 60,000 pounds for the tractor-trailer type has been turned down by the state senate committee on highways despite the fact the bill was strongly supported by industrialists.

Ben Moreell, president of Jones & Laughlin Steel Corp., was among those favoring the increase in load limit. He pointed out that the 45,000-pound load limit of Pennsylvania was at least 15,000 pounds below that for the surrounding states, where limits range from 60,000 to 74,000 pounds, and that under the present restriction plants in Pennsylvania would be severely handicapped. Unless the truck weight limit is raised, he said, his company would have to curtail its various Pennsylvania operations.

Steel sheets are unloaded from motor carrier at plant of Lustron Corp., Columbus, O.

Steelworkers To Plan Demands

Union wage policy and executive committees to meet in Pittsburgh next week to formulate wage and security proposals to be submitted to basic steel producers in July

WAGE and social security demands of the United Steelworkers of America-CIO will be formulated at meetings of the union's wage policy and executive committees in Pittsburgh next week.

The two-year contracts with basic steel producers may be reopened by giving 60-day notice before July 16. Negotiations then would start within 30 days on two issues: 1. Wages; and 2. social insurance.

Although pensions are not subject to negotiation this year under the terms of the contracts, the union is expected to attempt to inject this issue into the conferences.

Demands Outlined—The union already has hinted at the broad outlines of its 1949 demands. These include proposals for a broad social insurance program, covering life insurance, sickness and disability benefits, hospitalization and surgical expense reimbursement for employees and families, to be paid for by the companies. The union also has prepared proposals for a pension program to give workers $150 a month on retirement at age 65. Union will ask for an hourly wage increase, according to David J. McDonald, secretary-treasurer.

Some labor students believe this year's negotiations will center around a social insurance program. At the same time the union is expected to try to place their pension proposals on the agenda for future conferences.

Possibilities of any considerable general wage increase are considered slight in view of the softening in steel demand and in steelworks operations.

Union To Argue Profits—Preliminary statements by union leaders and the labor press indicate the steelworkers will emphasize the good profit showing of steel producers in 1948 and argue that the industry can afford concessions out of profits.

Details of the union demands will be formulated by the executive committee which will meet in the steel capital May 3 and 4 and by the wage policy committee which convenes May 5. The executive committee is composed of the 32 district directors in the United States and Canada and the four international officers, President Philip Murray, Van A. Bittner and James G. Timmes, vice presidents, and David J. McDonald, secretary-treasurer. The wage policy committee includes 170 elected representatives from the local unions.

Coming Labor Negotiations

COMING labor contract negotiations to be watched by metalworking executives include those between Ford Motor Co. and the United Auto Workers, starting May 15, United States Steel Corp. and the United Steelworkers, to start late in June

or early July, and between soft coal mine operators and John L. Lewis' United Mine Workers in June. Settlements in these cases will have an important influence in later negotiations, although the settlements may not establish a pattern to the same degree that they have in previous postwar years.

Follows a calendar of major contracts in the metalworking field expiring or reopening sometime during this year:

May—Western Electric Co., Baltimore and Chicago, with communications workers-Ind. and telephone workers-CIO; SKF Industries, Philadelphia with steelworkers-CIO; Aluminum Co. of America with steelworkers-CIO.

June — Automotive Tool & Die Manufacturers, Detroit, with auto workers-CIO; Chrysler Corp. with auto workers-CIO; American Smelting & Refining Co. with mine, mill workers-CIO; Carbide & Carbon Chemical Corp., Oak Ridge, Tenn., with atomic trades-AFL; soft coal operators with mine workers-Ind.

July—Basic steel producers with steelworkers-CIO; Caterpillar Tractor Co., Peoria, Ill., with auto workers-CIO; Douglas Aircraft Co., El Segundo, Calif., with machinists-Ind.; Ford Motor Co. with auto workers-CIO; Harbison-Walker Refractories Co. with brick and clay workers-AFL, sandstone workers-CIO; Diamond Alkali Co., Painesville, O., miners, District 50, Ind.; Phelps-Dodge Corp. with mine and mill workers-CIO and metal trades-AFL; Anaconda Copper Mining Co. with mine and mill workers-CIO and metal trades-AFL.

August — International Harvester Co., Chicago, with auto workers-CIO.

October—RCA Victor with electrical workers-CIO.

November—Curtiss-Wright Propeller Division, Clifton and Caldwell, N. J., with machinists-Ind.

December—Fruehauf Trailer Co. with auto workers-CIO; American Smelting & Refining Co., Corpus Christi, Tex., with chemical workers-AFL.

Foundry Employment Drops

EMPLOYMENT in iron and steel foundries dropped about 5 per cent during the first two months of the year and may show some further declines despite expected seasonal upswings in general business, Bureau of Employment Security, Federal Security Agency, reports.

Employment in the 236 reporting plants, constituting 50 per cent of the entire foundry industry, declined from 134,800 in December to 128,200 in February. Additional layoffs were avoided in numerous cases by a reduction in the number of hours worked.

Based on Bureau of Labor Statistics estimates of the total number of production workers in the industry, the decline was from 257,000 workers in December to 241,500 in February.

More Steel Per Capita

Production in first quarter of 1949 equal to annual output rate of 1300 pounds per person

RECORD steel production in first quarter this year was equal to annual output of over 1300 pounds of raw steel for each person in the United States, an increase of almost 8 per cent over 1949 per capita output, and more than 50 per cent over a decade ago, according to the American Iron & Steel Institute.

The new monthly record output of 8,388,965 net tons of ingots and steel for castings in March brought the total for the first three months of 1949 to 24,053,181 tons, nine per cent higher than a year earlier, or more than half the average annual output of the 1920s.

Continued production at the March rate, averaging nearly 1,894,000 tons a week, would make an annual total of over 98 million tons of steel, an increase of 10 million tons over 1948 output.

New Records—Production is breaking records not only in total tonnage, but in relation to growing population, the institute said, and the effect of this greatest steel production cycle is being felt everywhere in supplies as the factories of the country are rapidly balancing supply and demand for their products.

The institute pointed out the country has been getting the benefits from steel's large scale expansion and improvement programs not only in the record first quarter, but through the entire past year. In the latest 12 months more steel was produced than ever before in a similar length of time. The total of more than 90 million tons for the 12 months ended Mar. 31 was 1,500,000 tons greater than in the calendar year of 1948.

Shipments of finished steel exceeded 18 million tons in the first three months of 1949, equal to more than half of total 1939 shipments.

Steel companies increased their annual ingot capacity by about 1,800,000 tons in 1948 and plan to add nearly 2,200,000 tons this year. By the end of 1950 these programs call for capacity of almost 99 million tons, an increase of more than 20 million tons since 1937. Steel companies spent $583 million in 1948 and expect to spend $627 million in 1949 on new plants and equipment.

Rising Trend—The rapidly rising trend in production of raw steel is indicated by the following figures: From average monthly production of 5,951,728 net tons in the final quarter of 1945, output rose to a monthly average of 7,074,506 tons during 1947 and advanced to 7,377,811 tons in 1948, followed by the sharp rise in the first quarter of 1948 to a monthly average of 8,017,727 tons.

Geneva Sets New Records

GENEVA Steel Co. during March established new production records. Open hearth ingot output advanced to 117,898 net tons compared with the previous monthly record of 116,804 tons in December, 1948. Production of slabs and blooms also increased to 105,226 tons from the high of 93,210 tons set last November. Pig iron output was expanded to 88,101 tons, from a former high of 87,163.

Cold-Rolled Steel Usage Rises

SHIPMENTS of cold-rolled sheet and strip steel rose from 3,227,000 tons in 1940 to 8,651,000 tons in 1948, the American Iron & Steel Institute, New York, has pointed out. The increase resulted largely from a rise in consumption by household equipment manufacturers and automobile makers.

Meanwhile, shipments of hot-rolled sheet and strip climbed from 7,547,000 tons to 9,449,000 tons.

Shipments of hot-rolled merchant bars increased from 5,428,000 tons in 1940 to 8,124,000 tons in 1948. Cold-finished bar shipments rose from 824,000 tons in 1940 to 1,594,000 tons last year.

Carnegie Adds Coke Ovens

WHEN coke was pushed from a completely rebuilt battery of 61 by-product coke ovens at Clairton Works of Carnegie-Illinois Steel Corp., Clairton, Pa., on Apr. 20, coke production capacity to supply U. S. Steel blast furnaces in the Pittsburgh district reached a new high. This latest step in U. S. Steel's $900 million modernization program brings the number of ovens at Clairton to 1567 and adds an annual productive capacity of 325,000 tons.

Next move in the company's modernization program will come May 1 when demolition work starts on another old battery that will be replaced with new ovens.

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Industry Girds for Competition

Price reductions continue. Pressure exerted on suppliers of materials and parts to shave prices. More attention paid to manufacturing efficiency as buyers' market returns

COSTS are coming in for increasingly close scrutiny as industry prepares for the competitive struggles of today's buyers' market. Pressure is being exerted on suppliers of parts and materials to shave prices. More attention is being paid to internal costs and to manufacturing efficiency. Sales efforts grow more important daily.

These are some of the signs that the economy is reaching the end of the postwar boom and again is coming down to earth.

Price reductions are being announced with regularity. More are expected in the weeks to come. Premium prices virtually have disappeared.

Labor is talking softly. Leading industrialists are predicting there will be no general wage increases this year and that adjustments will be limited to fringe issues.

Steel Operations Edge Downward —Steel production, which established an alltime record during the first quarter, is falling off slightly. A few blast furnaces and open hearths and a considerable number of electric furnaces have been taken out of production for want of demand for the products they produce. The scrap market continues demoralized. Soft metals continue to weaken.

Employment is leveling off. Although the uptrend in unemployment has been halted, the seasonal improvement in employment is less than in recent years.

Psychology Changes — Fewer people are talking about the recent declines being "seasonal" and are admitting that the bloom is off the boom.

Surprisingly enough, many industrialists hail the change. Price shakeouts are welcome. And they are glad to shed some of the uneconomical practices forced upon them during the lush postwar sellers' market.

Backlogs of orders for most companies continue at a high level and promise a satisfactory level of operations in coming months, although generally somewhat below 1948.

Kaiser Absorbs Freight

KAISER CO. INC. is granting certain freight allowances on structural shapes, carbon bars, alloy bars, hot-rolled strip, hot-rolled sheet and cold-rolled strip to destinations considered within Fontana's marketing area.

New freight allowances extend to the San Francisco Bay area, heavy industrialized center where Kaiser is making an intensive, competitive sales effort, to outlying areas of California and other designated regions in the West.

The freight absorption action is designed to broaden Fontana's marketing areas and step up its competitive position. Kaiser adopted competitive mill prices a few weeks ago.

Diesel Locomotives Reduced

DIESEL locomotive price cuts averaging 5 per cent have been announced by American Locomotive Co., Electro-Motive Division of General Motors Corp., Baldwin Locomotive Works, General Electric Co. and Fairbanks, Morse & Co.

Alco's reductions range from $4000 to $9000 per unit. Electro-Motive has pared from $5000 to $8200 off the price of each locomotive, with the 6000 hp, 4-unit model cut by $31,400. Baldwin has reduced prices of its entire diesel line by 5 per cent. GE's action applies to its 44 and 70-ton standard diesel electrics. The move applies to all Fairbanks, Morse diesel models. Alco's action was effective Apr. 17; all the rest have put Apr. 18 as their effective date.

Pare Freezer Prices

INTERNATIONAL Harvester Co., Chicago, pared prices on its two models of home freezers on Apr. 15. Following a reduction on its line of household refrigerators a month ago, the company trimmed home freezer prices $28 and $25 on its 11 cu ft box and 15 cu ft box, respectively.

Motor Prices Down 3 to 14%

FRACTIONAL Horsepower Motor Divisions, General Electric Co., Schenectady, N. Y., has reduced prices of its line of definite purpose motors. Affected by the 3 to 14 per cent reduction are ⅛ through 1 horsepower motors used for sump-pumps, oil burners, belt-driven fans and jet-pumps. In addition, the company's Chemical Department has dropped Glyptal alkyd resin prices an average of 1¾ cents per pound, making the third reduction since last August.

Lukens Reduces Carbon Plates

PRICE of carbon steel plates was reduced $5 a ton on Apr. 18 by Lukens Steel Co., Coatesville, Pa. The decrease will result in a base price of $3.50 per 100 lb. f.o.b., Coatesville.

Standard Sanitary Less Active

PITTSBURGH and Baltimore plants of the American Radiator & Standard Sanitary Corp. are being closed down temporarily because of reduced activity in the building industry. About 2000 workers will be affected, 700 at Pittsburgh and 1300 at Baltimore. At the same time, 400 of 5600 employed at the company's Louisville works will be laid off.

The Pittsburgh and Baltimore plants produce enameled cast iron ware while the Louisville plant manufactures brass fittings and enameled cast iron ware.

Crane Co. Feels Building Lag

ANOTHER manufacturer of building supplies, the Crane Co., Chicago, has been affected by the slowing down in building. J. L. Holloway, president, reports the company has been running one of its plants on a limited schedule since early in January.

Vacuum Cleaner Sales Gain

FACTORY sales of standard-size household vacuum cleaners in March totaled 309,897 units, an increase of 28.4 per cent over the 241,267 units sold in February, but a decrease of 12.7 per cent from the 355,415 units sold in March, 1948.

Report Business Downtrend

DOWNTREND in business which began last November is expanding as fast as did the upward trend which took place in 1946-1948, according to the monthly survey of the Purchasing Agents of Chicago. Firms in the Chicago area which replied to the association's March questionnaire reported as follows on business conditions: Better, 10 per cent; same, 45 per cent; worse, 45 per cent.

Answering a special question concerning steel purchases, 47.1 per cent are buying from mills, 52.8 per cent are getting their steel from warehouses and only 0.1 per cent are purchasing premium steel. In answering a query as to whether they are staying with the old reliable suppliers who took care of their needs "when

times were tough" now that offerings at lower prices are being made by concerns previously not interested, 45 per cent of Chicago companies are staying with old reliable suppliers, 52 per cent are asking old suppliers to meet competitive prices and 3 per cent are switching to new sources because of price.

Acme Getting Semifinished

ACME Steel Co., Chicago, now can obtain all the semifinished steel it requires, C. J. Sharp, president, told stockholders last week. As a result the company, he said, is 100 per cent back in competition, in fact, is now again soliciting orders.

Steel Sales Top $8 Billion

STEEL sales in 1948 rose more than $1.4 billion over the preceding year and topped $8 billion for an all-time high for a peacetime year, according to the American Iron & Steel Institute. The total which includes gross receipts from fabricated products, by-products and steel mill products was more than double 1929 gross sales.

Companies included in the institute's report and who have 90 per cent of the raw steel capacity of the country had a total net income of about $542 million in 1948. Average profit for each sales dollar was 6.7 cents, up 8 per cent over 1947 but exceeded four times in the last 20 years when volume of steel production and sales were less than in 1948.

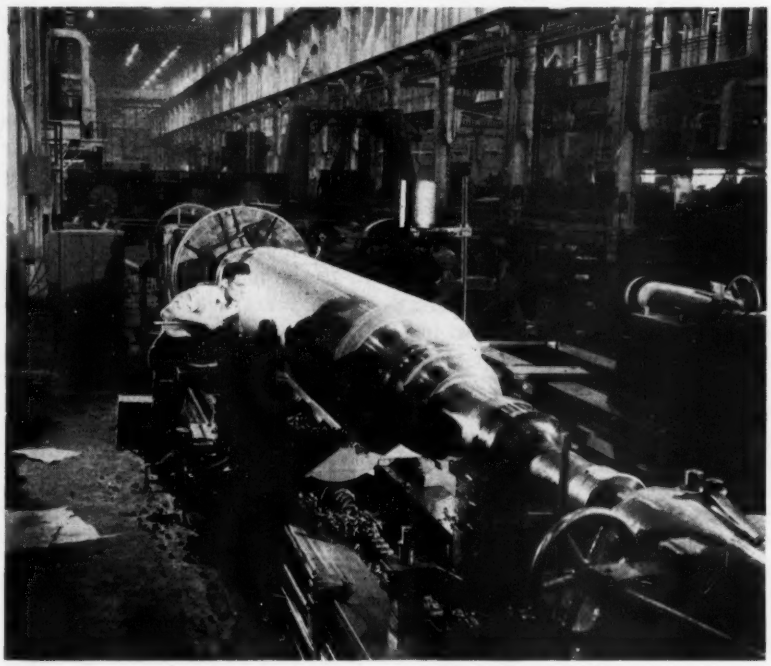
Dividends of $205 million showed an increase of less than $21 million or 11 per cent compared with 1947. Federal and state taxes, excluding social security taxes, showed the greatest relative increase of any item, rising to $494 million, up 32 per cent over the preceding year.

Employment costs, including social security and pensions, as well as wages and salaries, increased nearly 15 per cent to $2.8 billion.

Reports Steel Demand Decline

PRELIMINARY figures for the first quarter show larger sales volume than had been expected—but new orders for steel began declining sharply during the latter part of the period, William P. Snyder Jr., chairman, Crucible Steel Co. of America, New York, said last week.

Supply is rapidly catching up with demand, especially in tool steels and specialty steels, he said.



"FIRST LATHE" OPERATION: Limited production is under way in General Electric's new $30 million turbine building at Schenectady, N. Y., although the building is not yet completed. Above photo shows a huge steel forging, to become a field core for a 75,000 kw generator, undergoing the first lathe operation or grooving for air cooling. The forging is machined for eight days by three shifts to complete this operation. Then it will be moved to a slotter where horizontal slots will be cut the length of the steel body

Tool Sellers' Hopes Rise

Builders and distributors are encouraged by reports of sales gains here and there

SOME improvement in attitude as well as in volume of business is in evidence among machine tool builders and distributors. Reports come from Detroit that large new tooling programs are in the works and some new orders have been completed although the volume to date has not been sizable.

Tell Berna, general manager, National Machine Tool Builders' Association, gave hope to members of the American Machine Tool Distributors' Association at their Savannah, Ga., meeting recently when he pointed out that competition in the automobile industry points toward increased machine tool sales.

Aircraft Firms Active—West Coast aircraft firms, particularly Boeing, have also been more active in inquiries and placement of orders recently. The reshuffling in Air Corps contracts, however, has resulted in some cancellations and withdrawal of some inquiries.

Monarch Machine Tool Co., Sidney, O., reports a marked improvement in both foreign and domestic business during the first quarter of this year, resulting in net earnings of $117,731 on net sales of $1,841,848 compared with net earnings of $107,147 on net sales of $1,665,955 in the corresponding period last year. Jerome A. Raterman, president, reports the company's backlog is now $2,846,000, the highest it has been in seven months and over twice what it was a year ago.

Machine Tool Sales Index Up

CLIMBING to the best mark since August, 1946, total new orders for machine tools reached an index figure of 93.1 in March compared with 80.9 in February, according to National Machine Tool Builders' Association, Cleveland. Foreign orders, however, fell off to 22.3 from 26.5 in the preceding month, indicating that domestic business moved along at a fairly brisk pace.

Shipments index rose to 75.3 in March from 70.3 in February. Ratio of unfilled orders to shipments at the end of March was 4.4 to 1, compared with 4.7 to 1 a month earlier. All index figures used by the association are based on average monthly shipments for 1945-1947 being equal to 100.

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Scrap Trade in Quandary

Lack of substantial mill and foundry buying puts dealers in middle. Further squeeze seen

WARNING that "the day is close when established dealers in scrap will not be able to pay the producer of scrap anything at all for his scrap" was sounded by a group of Chicago dealers through local newspaper advertisements Apr. 15.

Entitled "The Truth about the Scrap Iron and Metal Market in Chicago" and addressed as an open letter to producers of scrap, the advertisement stated "the open market for scrap metals has, temporarily at least, ceased to exist," and asked for scrap generators' co-operation and understanding in what is described as "the most unusual situation in our history."

STEEL over a period of several weeks has interviewed Chicago dealers and brokers and representatives of steel mills, foundries and metalworking plants to learn whether the disappearance of normal volume trading in scrap forecasts the pile-up of scrap within generators' plants to such an extent production is seriously impeded. At this writing such a dangerous condition has not materialized, the general experience of metalworking plants having been that scrap continues to be taken out by collectors for sale or stored for future use.

Some Cut Intake—Many dealers, however, say that lack of demand for scrap has forced them to cut their intake by as much as 50 per cent; moreover, some say they would like to decrease their buying still further but hesitate to do so because their established customer relationships would suffer and they would be forced to lay off their trained personnel.

Part of the reduction in buying to date, however, has arisen from the somewhat lower rate of activity in many metalworking plants. Sudden resumption of normal buying could catch the entire scrap collecting and preparing industry off balance if the machinery were allowed to deteriorate because of today's conditions, they say.

Recently, Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc., declared that low level of scrap buying by consumers will result in revival of one of the primary functions of dealers—scrap piling.

STEEL's investigation indicates that scrap buying for stock is done very cautiously by dealers at this time because of the squeeze exerted upon them from two directions; purchasing agents, in determining a sale price for their scrap, make wide use of published quotations by contracting with dealers for the sale at an arbitrary reduction from these prices; brokers have widened their spread between buying and selling prices in recognition of the lower volume of business presently being handled. Hurt by the pinch is the dealer, with the result that some already have taken on other lines of business or have closed their yards.

Further Squeeze—Further squeeze on the scrap dealers is seen in the possibility of steel producers switching some blast furnaces from production of merchant iron to production of steelmaking iron. In a few instances this already has taken place and more switches are likely with merchant iron beginning to pile up in the face of lagging foundry demand. Production of more basic iron means curtailment of scrap consumption as more hot metal is used in steel melts.

With steel mill scrap inventories ranging all the way from 30 to 60 days this could only mean that mill buying of scrap will be that much further delayed. At the same time further depression of scrap prices may permit steel mill buyers to average out on a lower level their scrap investment by buying material later on at much lower prices than prevailed during the period they were accumulating scrap as protection against any interruptions in steel operations.

SCRAP: Awaiting dismantling at the Fontana scrap yard are 21 old Santa Fe locomotives, purchased by Kaiser Co. Inc. as fodder for the open hearths. Most of the locomotives date back to World War I

Information Please

Allegheny Ludlum officers answer employee and townspeople queries

TOP-LEVEL management of Allegheny Ludlum Steel Corp., Pittsburgh, was kept busy last week answering a lot of questions propounded by its employees and the townspeople of the communities in which the company's plants are located.

The occasion was the annual series of meetings held by the company to fully acquaint its 13,000 employees and its plant communities with the activities of the company and its plans for the future.

These meetings were inaugurated three years ago and the enthusiastic reception given them has encouraged company officials to expand the programs from year to year. This year a movie, "Star Bright," was added to the program.

This tells the story of the company's finances, its products, its plant expansion and improvement program, its research activities, and its hopes for the future. Questions not answered in the 20-minute long movie are answered by company officials in a question-and-answer period following the showing of the picture. This takes on something of the appearance of an "Information Please" program with the company officers serving as information experts.

Opens at Leechburg—Initial meetings last week were held at Leechburg, Pa., on Monday. On Tuesday and Wednesday meetings were held at Brackenridge, Pa., where, on Wed-

nesday, Hiland G. Batcheller, president, and his associate officials, were hosts to officers of the local of the United Steelworkers of America (CIO). Last year the union was host to the company officers. Later in the week officers of the company moved on to Dunkirk and Watervliet, N. Y., where meetings similar to those at Leechburg and Brackenridge were held.

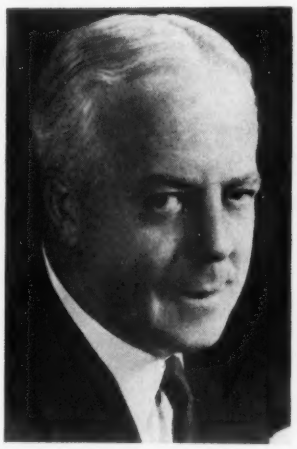
At the opening meeting in Leechburg, held in the West Leechburg High School, attended by supervisors of the West Leechburg plant, Mr. Batcheller demonstrated new stainless steel building material, a stainless steel carboy and a stainless steel milk can which he said were nearing commercial production and were striking examples of the expanding market for stainless steel of which Allegheny Ludlum is one of the largest producers. An office building of stainless steel is nearing completion at Schenectady, N. Y., while a Philadelphia fabricator is getting ready to produce the carboy and milk can in commercial quantities.

Department Heads Reply — Questions propounded at the various meetings were referred by Mr. Batcheller to the particular department head most concerned. For example, labor relations questions were answered by the personnel director, R. C. Edgar.

Many of the questions this year appeared directed toward obtaining official views with respect to the business outlook for the company. This probably was explained by the fact that over recent weeks the slowing down in steel demand has necessitated the temporary laying off of several hundred employees at the various Allegheny Ludlum plants.

With respect to the business outlook Mr. Batcheller told the meetings that while he was not in position to predict the immediate future because of the general uncertainty prevailing in business circles, he was optimistic for the long term and was confident that demand for the special high-grade steel products produced by Allegheny Ludlum, and the improved specialty steels being developed will continue to provide a high level of employment in the company's plants. In this connection an important research activity of the company concerns the development of titanium metal.

It was further brought out at the meeting that the company is planning installation of four electric furnaces of new design for production of carbon steel at lower cost than ever before has been possible in an electric furnace. F. B. Lounsberry, vice president and technical director, told



HILAND G. BATCHELLER

the meeting a process for direct reduction of oxide of iron from ore by use of gas, skipping the blast furnace, was under investigation jointly by Allegheny Ludlum, Massachusetts Institute of Technology and the Koppers Co.

At Brackenridge on Tuesday evening, Mr. Batcheller said orders of the company had fallen off some 10 per cent and that some 1300 employees had been temporarily laid off. In light of this the statement at a dinner the following evening by David J. McDonald, international secretary-treasurer of the steelworkers' union, that he thought the steelworkers would win a wage increase this year, was considered interesting.

Mr. Batcheller emphasized that cooperation throughout the entire organization will be needed to assure continued growth through the postwar adjustment period. However, he said, the company is not in debt, it has the workers, the plants and equipment to meet "whatever lies ahead."

Urges Mineral Conservation

WESTERN mineral resources and supplies of raw materials essential to steelmaking are limited and must be conserved. It is imperative therefore that the West receive the maximum yield in finished steel products from the raw materials on which its iron and steel industry rely for future production.

This was the note of caution sounded by Dr. Walter Mathesius, president of Geneva Steel Co., in an address to the Rotary Club in Los Angeles.

ASM Will Continue Show

SUCCESS of the Western Metal Congress and Exposition held in Los Angeles, Apr. 11-15, has resulted in plans to hold the technical sessions and show every two years on the Pacific Coast. William E. Eisenman, secretary of the American Society for Metals, announced that the 1951 meeting place will be either San Francisco or Oakland, Calif. The event probably will return to Los Angeles four years hence.

Wolcott Stresses Marketing

"A GOOD marketing policy—management's best judgment of what to offer for sale and how to sell it to realize maximum profit—is the backbone of any business," Robert W. Wolcott, president, Lukens Steel Company, Coatesville, Pa., told members of the Philadelphia chapter of the American Marketing Association Apr. 21 at the Poor Richard Club, Philadelphia.

Basically any marketing policy is a product of judgment, Mr. Wolcott said. Business policy-making must almost always represent a compromise of conflicting factors and an embarkation into the unknown, requiring assumption of risk on future company profits.

Launching of a new product involves something more than an idea, the steel executive said, pointing out one recent study indicates of all new products introduced in the two years following World War II, 98 per cent of them failed. Analyzing these failures it was found that their greatest causes lay within the marketing function. Distribution was bungled or the product found insufficient demand in consuming groups. In Mr. Wolcott's opinion losses could have been sharply reduced by better marketing.

From the standpoint of Lukens Steel Co., Mr. Wolcott said, new products are a major concern. For more than 100 years following the company's founding in 1810, it was engaged primarily in production of iron and steel plates and flanged heads. In 1918 a first step was taken toward raising Lukens above the stature of a middle-size plate producer with installation of the 206 in. mill, which is still the world's largest. A second fundamental step in Lukens' new product activities has been development of weldments, or welded assemblies of steel plate. A third direction of important new product growth by Lukens has been with stainless and nickel alloy clad steels.

"The biggest new product job," he said in conclusion, "has been, and is the marketing one—the evolution of specifically what to sell and how to sell it. Fulfillment of high marketing standards is not only essential to

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the welfare of your companies, but is of paramount importance to the orderly growth and strengthening of our entire economy."

Magnesium Use Amazes

Many popular misconceptions about metal cleared away at Chicago exhibition

AMAZEMENT over the growing use of magnesium was the typical reaction of visitors to the exhibition and fifth annual meeting of the Magnesium Association at the Edgewater Beach Hotel, Chicago, Apr. 19-20. In the technical sessions and in the exhibit booths many popular misconceptions about "mag" were cleared away.

The progress report on the industry delivered by W. S. Loose, general sales manager, Dow Chemical Co., Midland, Mich., points up the way what once was considered a premium aircraft material is now gaining wide recognition as a common commercial metal.

Sees Consumption Gain—"From all indications," Mr. Loose declared, "there should be an increase in primary magnesium consumption of about 60 per cent in 1949." This compares with 1948 consumption of 31 million pounds, which in turn compared with 25.5 million pounds in 1947. Last year, he stated, consumption by permanent mold, sand and die casting and for sheet showed only small increases; use of alloy ingots and billets, however, was more than double that of 1947, while extrusions and cast anodes showed respective increases in consumption of 36 and 50 per cent over the previous year.

In the current year such factors as the increased requirements of the 70-group Air Force for cast and wrought products, new markets now beginning to open up, and reduction in the amount of good secondary ingots on the market should spell a marked increase in primary metal consumption, he predicted. Price reductions effected last year and the material's basic availability are also important considerations. Magnesium sand castings, die castings and sheet requirements will be approximately double those of last year, he added.

New Development—One recent development, use of magnesium as the anode in the common dry cell, now in the experimental stage, could, Mr. Loose said, "require for a single application as much or more primary magnesium than is currently being used for all applications in this country." A further use, in which extensive research is now being carried on, is as an additive to gray iron to increase remarkably the properties of toughness, fluidity and machinability. Other fields in which magnesium use is on the increase, he said, include the transportation industry, where dead-weight elimination is an important factor, the materials handling equipment industry, the textile industry, furniture, graphic arts, and of course, the military. In this latter field, he said, the last year has seen planners and engineers extending their interest in magnesium to materiel other than aircraft.

Aircraft Use—Aircraft use continues very important to the industry, 30 per cent of the alloy consumption last year being for cast or wrought plane parts. This ratio is expected to increase somewhat this year. Use of sheets in aircraft is gaining prominence, airframe of the new B-36 bomber, for example, containing more than 10,000 pounds of this product.

New officers elected at the association's business meeting were: President, Arthur Winston, Dow Chemical Co.; vice president, Bruce Magill, Dominion Magnesium Ltd., Toronto, Canada; and treasurer, Ralph Ferguson, Eclipse-Pioneer Div., Teterboro, N. J., Bendix Aviation Corp. R. B. Brown continues as executive vice president and secretary.

NEW TOLEDO DOCK: This huge new $18.5 million coal and ore dock is in full scale operation at Toledo. Part of the facility was operated last year. It has three piers and supporting yards, and enhances Toledo's position as a coal port

Power Shortage Until 1952-53

FROM the power standpoint, this country is now on a hand-to-mouth basis. Additions to electric generating capacity have barely kept pace with the growth in needs in spite of an unprecedented rate of installation of new capacity. Not until 1952-53 can utility power supply be expected to reach the point where "more nearly adequate reserves will be available in most regions of the country." In the Northwest the shortage probably will last longer, until 1954 or later. So declared E. Robert de Luccia, chief, Bureau of Power, Federal Power Commission, at the Midwest Power Conference in Chicago last week.

Sponsored by Illinois Institute of Technology with the co-operation of midwestern universities and professional societies, the meeting, held for the eleventh time, attracted about 3000 engineers.

While "we have not yet reached the point . . . where we can estimate with any definiteness what the impact of another war would be on our total electric power requirement," said Edward Falck, chief consultant on power and utilities, National Security Resources Board, "The United States has a supply of the principal resources needed to construct any reasonable amount of power capacity."

In discussing atomic power, Dr. Norman Hilberry, deputy director, Argonne National Laboratory, Chicago, estimated that nuclear power might be available "in five years." He said two reactor units designed to test the breeding and power production aspects are in final planning stages and essentially ready for construction to begin. A development and materials testing reactor will be ready soon after results from operation of these first units are known.

Steel Industry Utilizes Period of High Earnings To Lay Up Strength for Less Favorable Times

NEW PEACETIME production records, increased prices, and operating efficiencies accruing from new equipment helped make 1948 an outstanding year financially for the steel industry. Although the 1948 performance in a number of respects exceeded that of 1947, as well as many other years, the year was not one entirely of new records.

While net earnings in 1948 rose 31½ per cent over those of 1947 and the per cent of total income on capitalization was higher than at any time since STEEL began compiling these financial summaries 21 years ago, the per cent earned on sales was below that of 1937 and 1940.

Prepare for "Rainy Day"—One of the significant features concerning 1948 is a 24 per cent increase in surplus over 1947, reflecting efforts of steel companies to lay up financial strength for weathering a "rainy day."

Of the 29 companies represented in the accompanying table only one showed a net deficit in 1948. It also had a net deficit in 1947. Although the other 28 companies showed net profits, five of them reported lower figures for 1948 than for 1947. However, the gains of the remaining 23 companies were sufficient to boost the aggregate net earnings before dividends to $526,259,173 in 1948, compared with $400,106,734 in 1947. This increase raised the industry's average earnings per share of common stock from $7.32 in 1947 to $9.36 in 1948. Preferred dividend requirements were up only slightly, from $41,539,829 in 1947 to $41,691,878 in 1948.

Stature of the steel industry's earning ability last year compared with the preceding nine years is shown graphically in the accompanying chart.

The strong earnings performance in 1948 put the average net income for each of the first 28 companies in the accompanying table at $18,794,970, slightly above the $18,746,000 average for 18 companies in the banner year of 1929.

The rise in earnings pushed the per cent of total income on capitalization to 10.73, highest of any year since STEEL began compiling these financial summaries in 1928. In 1947, the percentage was 9.49. However, the per cent of net earnings on sales was not as high in 1948 as in 1937 and 1940, the 1948 rate being 6.67, compared with 6.87 in 1937 and 7.48 in 1940. The 1947 rate was 6.18 per cent.

As a result of the new peacetime steel production record and increased prices, net sales and revenues in 1948 rose 22 per cent over 1947, the 1948 total of 28 companies representing more than 92 per cent of the nation's ingot capacity being $7,888,495,696, compared with $6,474,873,779 in 1947.

The step-up in earnings in 1948 pushed net income per ton of ingots produced to an average of $6.24 for each of 23 companies, compared with $4.99 in 1947. However, this rise was not the result solely of increased production, for the ingot output of the 23 companies rose only 3½ per cent, from 73,233,922 net tons in 1947 to 75,803,644 tons in 1948.

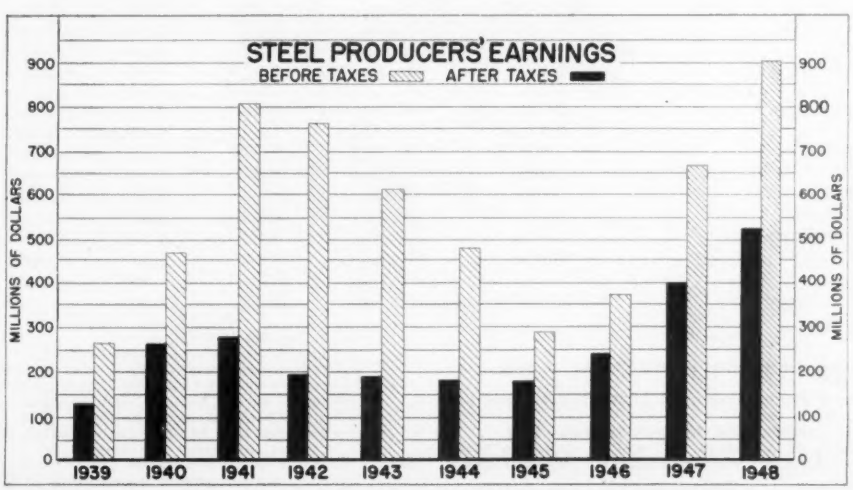
Ingot Capacity Up—Reflecting the steel industry's move to enlarge its production capacity, 27 of the companies in the tabulation had an aggregate ingot capacity of 86,330,120 net tons in 1948 compared with 84,572,880 tons in 1947.

In recognition of the current high costs of new plant and equipment some companies have supplemented their depreciation and depletion charges with provisions to help cover increased expenditures. As a result, the total provision of 28 companies for depreciation and depletion was 25 per cent higher last year than for the year before, the total for 1948 being $291,382,719, compared with $232,476,199 in 1947.

In strengthening themselves to withstand less favorable financial weather in the future, 28 of the companies built up their surplus from an aggregate of $1,607,820,414 in 1947 to $1,988,821,610 in 1948, a 24 per cent increase.

The increase in net earnings during 1948 made it necessary for the 28 companies to provide $376,480,184 for federal income taxes, 40 per cent more than the 1947 total.

To operate at near capacity levels, the 28 companies had 783,966 employees in 1948, an increase over the 747,586 of 1947. Also up were total payrolls, the 1948 aggregate for the 28 companies being $2,740,974,855 against 1947's $2,377,549,629.



	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation
	1948	1947	1948	1947	1948
United States Steel Corp.	8,703,252	8,703,252	$870,325,200	$652,743,900	$360,281,[illegible]
Bethlehem Steel Corp.	8,954,982	8,954,982	283,574,430	283,574,430	93,388,[illegible]
Republic Steel Corp.	5,882,604	5,669,922	135,979,066	130,309,141	28,214,[illegible]
Jones & Laughlin Steel Corp.	2,476,502	2,476,502	96,507,400	96,507,400	29,356,[illegible]
Youngstown Sheet & Tube Co.	1,675,008	1,675,008	105,088,053	105,088,053	None
National Steel Corp.	2,453,900	2,230,817	61,347,500	55,770,425	None
Inland Steel Co.	4,899,315	4,899,315	62,500,000	62,500,000	None
Armco Steel Corp.	3,909,361	3,241,276	39,093,612	32,412,764	19,993,[illegible]
Wheeling Steel Corp.	569,559	569,559	28,477,950	28,477,950	36,316,[illegible]
Crucible Steel Co. of America	488,683	443,684	12,217,077	11,092,097	31,357,[illegible]
Colorado Fuel & Iron Corp.[10]	1,127,185	1,126,775	5,635,925	5,633,875	10,028,[illegible]
Pittsburgh Steel Co.	508,917	508,917	4,862,190	4,862,190	16,438,[illegible]
Lukens Steel Co.[13]	317,976	317,976	3,179,760	3,179,760	None
Granite City Steel Co.	382,488	382,488	8,483,821	8,483,821	None
Sharon Steel Corp.	617,242	617,242	6,232,810	6,232,810	None
Alan Wood Steel Co.	483,767	200,000	4,874,030	4,388,889	7,182,[illegible]
Midvale Co.	600,000	600,000	10,574,621	10,574,621	None
Allegheny Ludlum Steel Corp.	1,288,831	1,288,831	8,055,194	8,055,194	10,738,[illegible]
Continental Steel Corp.	501,365	501,370	7,018,866	7,018,970	None
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None
Keystone Steel & Wire Co.	1,875,000[16]	625,000	2,604,166	2,604,167	None
Follansbee Steel Corp.[17]	442,228	345,688	4,402,287	3,419,511	None
A. M. Byers Co.[24]	264,635	264,635	2,646,350	2,646,350	5,317,[illegible]
Copperweld Steel Co.	514,864	514,864	2,574,320	2,574,320	1,444,[illegible]
Northwestern Steel & Wire Co.[20]	817,825	817,825	4,089,125	4,089,125	None
Rotary Electric Steel Co.	192,939	167,025	1,929,390	1,670,250	None
Carpenter Steel Co.[10]	360,000	360,000	1,800,000	1,800,000	None
Portsmouth Steel Corp.	1,273,200	1,301,550	1,273,200[26]	1,301,550[27]	None
Barium Steel Corp.[29]	1,978,831	2,001,381	1,978,831	2,001,381	None
Total (or average)	51,787,878	49,010,753	$1,779,471,343	$1,541,136,563	$650,056,[illegible]

	Preferred Dividend Requirements		Earnings Per Common Share		Dividends Per Share on Preferred		Dividends Per Share on Common
	1948	1947	1948	1947	1948	1947	1948
United States Steel Corp.	$25,219,677	$25,219,677	$12.00	$11.71	$ 7.00	$ 7.00	$ 6.00
Bethlehem Steel Corp.	6,537,209	6,537,209	9.36	4.98	7.00	7.00	2.40
Republic Steel Corp.	1,692,858	1,692,858	7.61	5.17	6.00	6.00	2.25[3]
Jones & Laughlin Steel Corp.	1,467,840	1,467,840	12.01	7.17	5.00	5.00	2.15
Youngstown Sheet & Tube Co.	None	None	21.32[4]	15.70[4]	None	None	5.00
National Steel Corp.	None	None	16.35	12.03	None	None	5.00[6]
Inland Steel Co.	None	None	7.88[7]	6.10[7]	None	None	3.00
Armco Steel Corp.	899,708	899,709	8.00[9]	7.44[8]	4.50	4.50	2.00
Wheeling Steel Corp.	1,815,830	1,815,830	23.24	17.27	5.00	5.00	2.75
Crucible Steel Co. of America	1,567,855	1,567,980	4.15	1.12	5.00	5.00	None
Colorado Fuel & Iron Corp.[10]	502,785	502,830	5.04	4.07	1.00	1.00	1.25
Pittsburgh Steel Co.	863,994	863,994	9.08	6.20	5.50[12]	6.87½[12]	None
Lukens Steel Co.[13]	None	None	7.58	8.92	None	None	1.50
Granite City Steel Co.	None	None	8.54	5.08	None	None	2.25
Sharon Steel Corp.	None	None	14.96	10.89	None	None	2.50
Alan Wood Steel Co.	353,084	502,768	7.78	7.26	5.00	17.00	1.00
Midvale Co.	None	None	2.78*	1.98*	None	None	1.75
Allegheny Ludlum Steel Corp.	319,754	None	5.05	4.66	3.00	None	2.00
Continental Steel Corp.	None	None	3.24	2.59	None	None	1.75
Laclede Steel Co.	None	None	8.57	6.93	None	None	3.50
Keystone Steel & Wire Co.	None	None	2.22[16]	7.48	None	None	1.00[16]
Follansbee Steel Corp.[17]	None	None	5.29	8.22	None	None	3.00
A. M. Byers Co.[24]	374,332	380,737	7.39	4.93	7.00	7.00	1.00
Copperweld Steel Co.	76,952	81,852	9.54[19]	2.85[19]	2.50	2.50	2.70
Northwestern Steel & Wire Co.[20]	None	6,545	2.27	2.36	None	8.73	1.00
Rotary Electric Steel Co.	None	None	12.94	5.41	None	None	2.00[6]
Carpenter Steel Co.[10]	None	None	4.32	6.38[22]	None	None	2.50
Portsmouth Steel Corp.	None	None	3.54	3.03	None	None	1.00
Barium Steel Corp.[29]	None	None	1.32	0.84	None	None	None
Total (or average)	$41,691,878	$41,539,829	$9.36	$7.32	.....	.....	.....

NA—Not available.

* Deficit.

[1] Includes accelerated depreciation of $55,335,444 in 1948 and $26,300,000 in 1947.

[2] Includes accelerated depreciation of $7 million in 1948 and $4 million in 1947.

[3] Plus one share of common stock for each 25 shares held.

[4] Before appropriating $6 million in 1948 and $4 million in 1947 for increased construction and replacement costs and contingencies.

[5] Includes accelerated depreciation of $10,500,000 in 1948 and $3,500,000 in 1947.

[6] Plus a 10 per cent stock dividend.

[7] Before appropriating $3,850,000 in 1948 and $7,300,000 in 1947 for reserves for possible future inventory price decline.

[8] Based on outstanding stock averaging 3,891,526 shares in 1948 and 3,240,523 shares in 1947.

[9] Includes $594,483 in 1948 and $594,483 in 1947 for amortization of emergency facilities.

[10] Fiscal year ended June 30.

[11] Includes accelerated depreciation of $96,922.

[12] Payment on prior preferred; payment on class A preferred

Income Preferation Va. 1947	Net Sales 1948	Net Sales 1947	Net Profit Margin Per Cent 1948	Net Profit Margin Per Cent 1947
8.16	$2,481,508,535	$2,122,786,243	5.22	5.99
7.93	1,315,188,536	1,034,856,444	6.87	4.93
9.00	766,400,960	645,328,877	6.06	4.81
7.04	446,057,301	350,132,366	7.00	5.49
2.72	381,742,264	308,571,405	9.35	8.52
1.71	436,522,051	328,957,189	9.19	8.16
6.31	394,715,858	316,215,642	9.83	9.49
3.27	382,563,811	311,685,322	8.37	8.02
7.52	154,953,406	131,721,128	9.71	8.85
3.22	131,360,030	110,503,836	2.74	1.87
8.92	118,858,896	94,740,442	5.20	5.37
9.08	102,852,785	85,873,538	5.33	4.68
7.82	61,460,919	52,773,066	3.92	5.37
5.82	41,380,694	25,869,719	7.90	7.51
0.09	118,849,560	94,130,807	7.77	7.14
1.36	47,480,574	35,971,661	8.67	5.44
5.80*	10,509,015	14,829,373	15.85*	8.00*
5.11	126,780,255	106,783,183	5.39	5.62
9.32	29,743,309	27,086,139	5.46	4.79
5.49	34,072,411	26,283,120	5.19	5.44
6.09	34,504,429	31,573,658	12.08	14.80
4.28	36,739,240	28,715,064	6.37	9.90
9.12	31,760,743	25,076,633	7.35	6.73
1.03[19]	75,570,115	53,303,245	6.60[19]	2.90[19]
1.33	26,641,518	21,185,519	6.98	9.12
1.30	18,940,250	16,500,149	13.18	5.47
7.67[22]	22,433,568	23,960,059	6.93	9.59[22]
4.04	58,904,663	49,459,952	7.66	7.98
6.48	51,257,671	41,365,948	5.10	4.08
9.49	$7,888,495,696	$6,474,873,779	6.67	6.18

Assets 1947	Current Assets 1948	Current Assets 1947	Current Liabilities 1948	Current Liabilities
$2,136,424,065	$974,361,251	$964,993,485	$504,855,814	$416
948,570,613	505,596,791	485,886,595	224,952,249	195
455,060,571	227,082,058	196,021,638	78,448,966	71
341,328,755	170,522,706	137,369,641	63,135,628	48
277,510,221	202,688,266	167,412,208	53,602,411	48
292,361,297	139,008,084	106,900,893	40,845,736	33
243,724,217	158,638,518	137,089,385	37,362,528	32
248,791,869	168,448,951	122,087,231	55,915,670	45
159,016,970	70,298,872	65,170,519	13,910,444	12
109,499,530	49,960,614	50,801,960	17,418,719	18
83,391,168	35,961,933	35,940,352	16,867,352	18
64,608,277	37,658,005	34,132,401	14,107,138	13
23,990,231	18,627,058	14,049,684	9,687,707	6
24,260,095	13,255,045	10,578,760	6,350,263	5
48,570,231	44,197,032	33,185,462	19,422,537	14
21,981,691	12,964,388	10,375,200	6,519,920	4
23,486,462	13,863,127	16,902,710	1,428,165	1
52,491,502	42,497,279	32,079,557	12,592,714	11
17,858,538	10,294,007	9,669,690	2,920,402	3
12,750,515	8,769,308	7,069,230	3,763,918	2
16,899,490	11,569,164	7,573,709	6,331,355	3
15,782,564	13,462,949	10,056,195	5,785,730	3
23,022,766	11,965,661	10,084,663	4,587,983	4
21,973,658	16,617,911	15,670,169	8,048,469	6
7,075,743	5,356,107	3,466,731	3,209,413	1
5,855,108	3,661,564	4,216,648	1,317,558	1
17,167,735	11,982,408	12,269,136	3,248,983	3
23,147,056	17,194,942	15,510,335	7,833,354	6
21,586,769	13,820,754	12,063,001	8,789,343	8
$5,716,600,938	$2,996,503,999	$2,716,564,187	$1,224,471,126	$1,035

PER CENT EARNED ON SALES

1937.....	6.87	1943.....	2.79
1938.....	*0.44	1944.....	2.68
1939.....	5.66	1945.....	3.06
1940.....	7.48	1946.....	5.46
1941.....	5.44	1947.....	6.18
1942.....	3.46	1948.....	6.67

* Loss

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	Number of Shares of Common Stock Outstanding		Common Stock Valuation		Preferred Stock Valuation
	1948	1947	1948	1947	1948
United States Steel Corp.	8,703,252	8,703,252	$870,325,200	$652,743,900	$360,281,1
Bethlehem Steel Corp.	8,954,982	8,954,982	283,574,430	283,574,430	93,388,7
Republic Steel Corp.	5,882,604	5,669,922	135,979,066	130,309,141	28,214,3
Jones & Laughlin Steel Corp.	2,476,502	2,476,502	96,507,400	96,507,400	29,356,8
Youngstown Sheet & Tube Co.	1,675,008	1,675,008	105,088,053	105,088,053	None
National Steel Corp.	2,453,900	2,230,817	61,347,500	55,770,425	None
Inland Steel Co.	4,899,315	4,899,315	62,500,000	62,500,000	None
Armco Steel Corp.	3,909,361	3,241,276	39,093,612	32,412,764	19,993,0
Wheeling Steel Corp.	569,559	569,559	28,477,950	28,477,950	36,316,6
Crucible Steel Co. of America	488,683	443,684	12,217,077	11,092,097	31,357,6
Colorado Fuel & Iron Corp.[10]	1,127,185	1,126,775	5,635,925	5,633,875	10,028,0
Pittsburgh Steel Co.	508,917	508,917	4,862,190	4,862,190	16,438,2
Lukens Steel Co.[13]	317,976	317,976	3,179,760	3,179,760	None
Granite City Steel Co.	382,488	382,488	8,483,821	8,483,821	None
Sharon Steel Corp.	617,242	617,242	6,232,810	6,232,810	None
Alan Wood Steel Co.	483,767	200,000	4,874,030	4,388,889	7,182,5
Midvale Co.	600,000	600,000	10,574,621	10,574,621	None
Allegheny Ludlum Steel Corp.	1,288,831	1,288,831	8,055,194	8,055,194	10,738,3
Continental Steel Corp.	501,365	501,370	7,018,866	7,018,970	None
Laclede Steel Co.	206,250	206,250	4,125,000	4,125,000	None
Keystone Steel & Wire Co.	1,875,000[16]	625,000	2,604,166	2,604,167	None
Follansbee Steel Corp.[17]	442,228	345,688	4,402,287	3,419,511	None
A. M. Byers Co.[24]	264,635	264,635	2,646,350	2,646,350	5,317,2
Copperweld Steel Co.	514,864	514,864	2,574,320	2,574,320	1,444,6
Northwestern Steel & Wire Co.[20]	817,825	817,825	4,089,125	4,089,125	None
Rotary Electric Steel Co.	192,939	167,025	1,929,390	1,670,250	None
Carpenter Steel Co.[10]	360,000	360,000	1,800,000	1,800,000	None
Portsmouth Steel Corp.	1,273,200	1,301,550	1,273,200[26]	1,301,550[27]	None
Barium Steel Corp.[29]	1,978,831	2,001,381	1,978,831	2,001,381	None
Total (or average)	51,787,878	49,010,753	$1,779,471,343	$1,541,136,563	$650,056,2

	Preferred Dividend Requirements		Earnings Per Common Share		Dividends Per Share on Preferred		Dividends Per Share on Common
	1948	1947	1948	1947	1948	1947	1948
United States Steel Corp.	$25,219,677	$25,219,677	$12.00	$11.71	$ 7.00	$ 7.00	$ 6.00
Bethlehem Steel Corp.	6,537,209	6,537,209	9.36	4.98	7.00	7.00	2.40
Republic Steel Corp.	1,692,858	1,692,858	7.61	5.17	6.00	6.00	2.25[3]
Jones & Laughlin Steel Corp.	1,467,840	1,467,840	12.01	7.17	5.00	5.00	2.15
Youngstown Sheet & Tube Co.	None	None	21.32[4]	15.70[4]	None	None	5.00
National Steel Corp.	None	None	16.35	12.03	None	None	5.00[3]
Inland Steel Co.	None	None	7.88[7]	6.10[7]	None	None	3.00
Armco Steel Corp.	899,708	899,709	8.00[8]	7.44[8]	4.50	4.50	2.00
Wheeling Steel Corp.	1,815,830	1,815,830	23.24	17.27	5.00	5.00	2.75
Crucible Steel Co. of America	1,567,855	1,567,980	4.15	1.12	5.00	5.00	None
Colorado Fuel & Iron Corp.[10]	502,785	502,830	5.04	4.07	1.00	1.00	1.25
Pittsburgh Steel Co.	863,994	863,994	9.08	6.20	5.50[12]	6.87½[12]	None
Lukens Steel Co.[13]	None	None	7.58	8.92	None	None	1.50
Granite City Steel Co.	None	None	8.54	5.08	None	None	2.25
Sharon Steel Corp.	None	None	14.96	10.89	None	None	2.50
Alan Wood Steel Co.	353,084	502,768	7.78	7.26	5.00	17.00	1.00
Midvale Co.	None	None	2.78*	1.98*	None	None	1.75
Allegheny Ludlum Steel Corp.	319,754	None	5.05	4.66	3.00	None	2.00
Continental Steel Corp.	None	None	3.24	2.59	None	None	1.75
Laclede Steel Co.	None	None	8.57	6.93	None	None	3.50
Keystone Steel & Wire Co.	None	None	2.22[16]	7.48	None	None	1.00[16]
Follansbee Steel Corp.[17]	None	None	5.29	8.22	None	None	3.00
A. M. Byers Co.[24]	374,332	380,737	7.39	4.93	7.00	7.00	1.00
Copperweld Steel Co.	76,952	81,852	9.54[19]	2.85[19]	2.50	2.50	2.70
Northwestern Steel & Wire Co.[20]	None	6,545	2.27	2.36	None	8.73	1.00
Rotary Electric Steel Co.	None	None	12.94	5.41	None	None	2.00[3]
Carpenter Steel Co.[10]	None	None	4.32	6.38[22]	None	None	2.50
Portsmouth Steel Corp.	None	None	3.54	3.03	None	None	1.00
Barium Steel Corp.[29]	None	None	1.32	0.84	None	None	None
Total (or average)	$41,691,878	$41,539,829	$9.36	$7.32	....	....	....

NA—Not available.

* Deficit.

[1] Includes accelerated depreciation of $55,335,444 in 1948 and $26,300,000 in 1947.

[2] Includes accelerated depreciation of $7 million in 1948 and $4 million in 1947.

[3] Plus one share of common stock for each 25 shares held.

[4] Before appropriating $6 million in 1948 and $4 million in 1947 for increased construction and replacement costs and contingencies.

[5] Includes accelerated depreciation of $10,500,000 in 1948 and $3,500,000 in 1947.

[6] Plus a 10 per cent stock dividend.

[7] Before appropriating $3,850,000 in 1948 and $7,300,000 in 1947 for reserves for possible future inventory price decline.

[8] Based on outstanding stock averaging 3,891,526 shares in 1948 and 3,240,523 shares in 1947.

[9] Includes $594,483 in 1948 and $594,483 in 1947 for amortization of emergency facilities.

[10] Fiscal year ended June 30.

[11] Includes accelerated depreciation of $96,922.

[12] Payment on prior preferred; payment on class A preferred

Financial Analysis of the Steel Ind

Official Returns from Twenty-Nine Producers, Representing More Than 92 Per Cen

Preferred Stock Valuation 1947	Funded Debt 1948	Funded Debt 1947	Surplus 1948	Surplus 1947	Total Capitalization 1948	Total Capitalization 1947	Capitalization Per Ton Ingot Capacity 1948	Capitalization Per Ton Ingot Capacity 1947	Prov Depreciatio 1948
$360,281,100	$71,554,196	$77,229,313	$602,453,693	$497,846,337	$1,904,614,189	$1,588,100,650	$60.85	$50.90	$145,986,681[1]
93,388,700	121,814,000	123,814,000	268,208,157	188,459,762	766,985,287	689,236,892	55.58	53.43	30,222,602
28,214,300	69,489,178	77,175,270	163,970,323	134,591,348	397,652,867	370,290,059	46.24	43.06	23,016,740[3]
29,356,800	60,000,000	60,094,664	125,303,616	102,361,267	311,167,816	288,320,131	64.62	60.83	16,131,249
None	30,000,000	30,000,000	99,474,676	78,137,984	234,562,729	213,226,037	58.61	53.28	11,511,049
None	40,000,000	40,000,000	167,457,222	144,066,831	268,804,722	239,837,256	66.37	61.50	21,506,270[7]
None	73,250,000	54,000,000	95,561,697	75,502,744	231,311,697	192,002,744	68.03	56.47	8,285,338
19,993,000	69,160,000	37,000,000	127,431,754	107,094,839	255,678,366	196,500,603	71.76	58.36	8,161,074
36,316,600	42,103,000	42,850,000	48,649,214	36,981,286	155,546,764	144,625,836	110.40	102.64	5,390,827[9]
31,357,900	25,007,500	24,505,000	24,836,603	22,807,983	93,418,780	89,762,980	73.15	71.80	2,477,594
10,056,357	8,800,000	9,750,000	42,478,406	34,874,261	66,942,398	60,314,493	45.48	41.64	3,204,745
16,438,200	5,660,000	5,205,000	26,519,999	21,859,669	53,480,389	48,365,059	49.89	45.12	1,924,922
None	916,667	None	14,686,885	12,733,059	18,783,312	15,912,819	30.10	25.50	1,047,539
None	2,882,525	4,185,000	8,229,786	5,822,682	19,596,132	18,491,503	31.61	36.98	1,010,998
None	9,900,000	4,000,000	32,392,770	23,761,861	48,525,580	33,994,671	29.02	20.33	1,965,726
7,182,433	6,300,000	None	7,553,416	5,637,679	25,738,866	17,209,001	46.80	31.29	1,228,884
None	None	None	7,159,833	9,874,500	17,734,454	20,449,121	34.28	39.53	520,000
None	None	None	35,276,183	31,683,177	54,069,677	39,738,371	108.93	80.06	2,009,786
None	None	None	8,074,734	6,890,353	15,093,600	13,909,323	41.47	38.21	493,501
None	2,309,673	2,437,500	4,193,831	3,147,843	10,628,504	9,710,343	32.60	29.78	568,901
None	2,000,000	2,000,000	10,769,050	8,476,499	15,373,216	13,080,666	50.84	43.26	420,052
None	None	None	10,764,305	8,430,408	15,166,592	11,849,919	107.47	83.97	624,118
5,439,100	None	None	12,147,624	10,397,811	20,111,074	18,483,261	[25]	[25]	916,817
1,623,000	None	3,125,000	9,795,974	7,461,715	13,814,294	14,784,035	[18]	[18]	795,591
None	None	None	1,450,393	587,741	5,539,518	4,676,866	17.26	14.57	197,522
None	None	731,654	4,151,847	2,067,287	6,081,237	4,469,191	17.89	17.53	167,074
None	None	None	11,881,144	11,203,246	13,681,144	13,003,246	182.71	173.65	328,936
None	None	None	17,948,475	15,060,242	19,300,975	16,412,742	29.24	24.87	1,268,183
None	None	None	10,573,590	8,250,755	12,552,421	10,252,136	[21]	[21]	516,037
$639,647,490	$641,146,739	$598,102,401	$1,988,821,610	$1,607,820,414	$5,059,404,179	$4,386,757,818	$58.59	$51.77	$291,382,719

Dividends Per Share on Common 1947	Average Number Employed 1948	Average Number Employed 1947	Total Payrolls 1948	Total Payrolls 1947	Rated Ingot Capacity Net Tons 1948	Rated Ingot Capacity Net Tons 1947	Ingot Production Net Tons 1948	Ingot Production Net Tons 1947	Steel Operating Rate Per Cent 1948	Steel Operating Rate Per Cent 1947	Net Income Per Ton Ingots Produced 1948	Net Income Per Ton Ingots Produced 1947
$5.25	296,785	286,316	$1,029,250,393	$890,112,230	31,300,000	31,200,000	29,300,000	28,600,000	93.80	96.70	$4.42	$4.44
2.00	146,988	134,603	494,537,405	416,762,492	13,800,000	12,900,000	13,411,492	12,806,940	97.18	99.28	6.74	3.99
2.00	70,521	67,382	245,554,588	219,701,447	8,600,000	8,600,000	8,324,172	7,987,170	96.79	92.87	5.58	3.88
2.00	43,474	41,583	151,307,924	136,139,400	4,815,000	4,740,000	4,633,558	4,520,387	96.23	95.36	6.74	4.25
5.00	26,659	25,813	99,751,252	81,310,917	4,002,000	4,002,000	3,966,099	3,959,343	99.10	98.93	9.00[1]	6.64[1]
4.00	28,299	26,728	110,709,056	95,113,863	4,050,000	3,900,000	NA	NA	NA	NA	NA	NA
2.50	23,594	22,110	91,429,503	76,985,753	3,400,000	3,400,000	3,533,374	3,299,528	103.92	97.04	10.93	9.06
2.00	30,497	28,844	105,412,258	92,787,905	3,563,000	3,367,000	3,332,261	3,078,487	93.52	91.43	9.61	8.12
1.75	15,178	14,237	56,858,624	49,173,316	1,409,000	1,409,000	1,303,424	1,285,832	92.51	91.26	11.55	9.06
None	15,589	15,804	55,187,000	50,333,000	1,277,133	1,250,133	NA	NA	NA	NA	NA	NA
0.85	15,226	14,666	48,698,498	40,552,156	1,472,000	1,448,640	1,395,717	1,369,460	94.82	94.53	4.43	3.72
None	9,795	9,734	37,264,985	33,159,971	1,072,000	1,072,000	976,218	1,006,887	91.07	93.93	5.62	3.99
1.40	5,248	5,067	18,033,124	16,742,944	624,000	624,000	647,876	637,347	103.83	102.14	3.72	4.45
1.00	2,570	2,341	8,739,982	7,403,037	620,000	500,000	493,720	440,398	79.63	88.08	6.62	4.41
2.00	9,760	9,448	35,376,776	28,488,985	1,672,000	1,672,000	1,298,383	1,222,887	77.65	76.62	7.11	5.50
None	3,292	3,169	10,889,674	9,771,253	550,000	550,000	530,691	449,945	96.49	81.81	7.76	4.35
2.00	2,593	2,556	5,296,406	8,914,954	517,322	517,322	64,962	84,020	12.56	16.24	25.64[4]	14.12
2.00	12,645	12,531	45,519,013	39,463,404	496,360	496,360	462,306	411,107	93.14	82.82	14.78	14.60
1.50	2,554	2,648	8,140,217	8,717,777	364,000	364,000	317,927	316,644	87.34	86.99	5.11	4.16
2.50	2,474	2,240	8,139,117	6,659,711	326,025	326,025	278,170	288,038	85.32	88.35	6.36	4.96
3.05	2,167	2,128	8,795,495	8,368,648	302,400	302,400	298,882	288,561	98.84	95.42	13.94	16.11
2.50	2,235	2,200	7,720,846	7,675,886	141,120	141,120	NA	NA	NA	NA	NA	NA
0.25	3,016	2,841	10,004,434	8,802,407	[25]	[25]	[25]	[25]	[25]	[25]	[25]	[25]
0.80	3,000	3,200	13,597,200	11,835,800	554,400	480,000	NA	NA	NA	NA	NA	NA
1.35	1,808	1,574	6,670,390	5,344,211	321,000	321,000	287,670	261,045	89.62	81.32	6.46	7.30
None	668	958	3,302,727	3,893,600	340,000	255,000	247,658	201,556	94.50	79.04	10.08	4.49
3.00	2,843	2,858	9,494,668	9,864,314	81,360	74,880	51,268	51,322	68.47[23]	68.55	30.31	44.77
0.75	4,488	4,007	15,293,300	13,470,248	660,000	660,000	647,816	667,011	98.15	101.06	6.96	5.9
None	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[21]	[21]
....	783,966	747,586	$2,740,974,855	$2,377,549,629	86,330,120	84,572,880	75,803,644	73,233,922	94.39	92.93	$6.24	$4.9

$5.00 in 1948, 62½c in 1947; no payments either year on class B preferred.

[13] Fiscal years were 52 weeks ended Oct. 30, 1948, and 56 weeks ended Nov. 1, 1947.

[14] After appropriating $650,000 for inventory price declines and other contingencies.

[15] Less treasury stock, common and preferred at cost of $171,080.

[16] After 3-for-1 split.

[17] Comparison of company's earnings with steel ingot capacity or output would be misleading as company buys all hot strip used in manufacture of cold-reduced coils, sheet, strip and seamless roofing.

[18] Comparisons would be misleading inasmuch as company's operations include a wire and cable division with no steel ingot capacity.

[19] Before provision of $1,200,000 in 1948 and $300,000 in 1947 for possible market decline in inventories and for contingencies.

[20] Fiscal year ended July 31.

[21] Not applicable to company's operations.

[22] After providing $250,000 for decline in scrap prices.

[23] Calculated on 74,880-ton capacity as capacity was expanded after June 30, 1948.

[24] Fiscal year ended Sept. 30.

[25] Not applicable as company's principal business is w

[26] Does not include $54,300 as value of retired st treasury and $25,000 as stock subscribed but not

[27] Does not include $25,950 as value of retired st treasury and $25,000 as stock subscribed but not

[28] Estimated recovery of income taxes through car ducts charge to surplus to $506,727.

[29] Figures on this company not included in grand to Boldface type is used under those columns in w from all the first 28 companies were not available

e Steel Industry for 1948

enting More Than 92 Per Cent of Steelmaking Capacity

	Capitalization Per Ton Ingot Capacity		Provision for Depreciation and Depletion		Total Income Before Dividends and Interest on Bonds		Per Cent Total Income of Capitalization	
	1948	1947	1948	1947	1948	1947	1948	1947
0	$60.85	$50.90	$145,986,681[1]	$114,045,483[1]	$132,022,190	$129,605,877	6.93	8.16
2	55.58	53.43	30,222,602	25,463,456	93,864,061	54,629,448	12.24	7.93
9	46.24	43.06	23,016,740[2]	18,901,535[2]	48,596,406	33,308,777	12.22	9.00
1	64.62	60.83	16,131,249	13,193,133	32,872,451	20,287,584	10.56	7.04
7	58.61	53.28	11,511,049	10,499,976	36,536,732	27,124,923	15.58	12.72
6	66.37	61.50	21,506,270[5]	12,853,292[5]	41,378,649	28,095,931	15.39	11.71
4	68.03	56.47	8,285,338	7,932,076	40,246,673[7]	31,316,142[7]	17.40	16.31
3	71.76	58.36	8,161,074	6,951,619	33,855,670	26,077,023	13.24	13.27
6	110.40	102.64	5,390,827[9]	4,877,727[9]	14,311,516	10,878,696	9.20	7.52
0	73.15	71.80	2,477,594	2,159,519	4,395,346	2,891,207	4.70	3.22
3	45.48	41.64	3,204,745	2,726,350	6,508,776	5,381,223	9.72	8.92
9	49.89	45.12	1,924,922	1,813,965[11]	5,798,587	4,393,635	10.84	9.08
9	30.10	25.50	1,047,539	999,558	2,459,052	2,835,702	13.09	17.82
3	31.61	36.98	1,010,998	887,611	3,394,533[14]	2,926,094	17.32	15.82
1	29.02	20.33	1,965,726	1,470,495	9,468,872	6,829,010	19.51	20.09
1	46.80	31.29	1,228,884	903,587	4,196,944	1,955,446	16.31	11.36
1	34.28	39.53	520,000	520,000	1,665,718*	[28]1,186,727*	9.39*	5.80*
1	108.93	80.06	2,009,786	1,635,919	6,833,384	6,002,657	12.64	15.11
3	41.47	38.21	493,501	490,855	1,625,150	1,296,874	10.77	9.32
3	32.60	29.78	568,901	481,549	1,842,082	1,504,035	17.33	15.49
6	50.84	43.26	420,052	388,329	4,214,425	4,721,453	27.41	36.09
9	107.47	83.97	624,118	396,839	2,339,996	2,877,550	15.43	24.28
1	[25]	[25]	916,817	833,326	2,331,034	1,685,093	11.59	9.12
5	[18]	[18]	795,591	637,961	5,184,764[19]	1,630,703[19]	37.53[19]	11.03[19]
6	17.26	14.57	197,522	180,670	1,858,790	1,932,747	33.56	41.33
1	17.89	17.53	167,074	140,472	2,524,479	951,845	41.51	21.30
6	182.71	173.65	328,936	285,872	1,553,783	2,298,071[22]	11.36	17.67[22]
2	29.24	24.87	1,268,183	805,025	4,511,550	3,944,969	23.37	24.04
6	[21]	[21]	516,037	395,667	2,615,270	1,689,213	20.83	16.48
8	**$58.59**	**$51.77**	$291,382,719	$232,476,199	$543,060,177	$416,195,988	10.73	9.49

	Steel Operating Rate Per Cent		Net Income Per Ton Ingots Produced		Net Income Per Ton Ingot Capacity		Federal Income Taxes		Total Assets	
	1948	1947	1948	1947	1948	1947	1948	1947	1948	1947
0	93.80	96.70	$4.42	$4.44	$4.14	$4.07	$109,000,000	$91,000,000	$2,534,971,836	$2,136,42
0	97.18	99.28	6.74	3.99	6.55	3.96	57,225,000	31,000,000	1,029,000,177	948,57
0	96.79	92.87	5.58	3.88	5.40	3.61	34,000,000	23,250,000	489,086,371	455,06
7	96.23	95.36	6.74	4.25	6.48	4.06	18,950,000	11,482,000	379,117,410	341,32
3	99.10	98.93	9.00[4]	6.64[4]	8.92[4]	6.57[4]	25,400,000	16,635,000	311,677,377	277,51
	NA	NA	NA	NA	9.91	6.88	33,300,000	19,270,000	329,884,289	292,36
8	103.92	97.04	10.93	9.06	11.35	8.79	23,221,000	18,485,000	292,821,723	243,72
7	93.52	91.43	9.61	8.12	8.99	7.43	20,072,015	16,464,876	316,203,962	248,79
2	92.51	91.26	11.55	9.06	10.68	8.27	10,000,000	7,754,059	171,695,218	159,01
	NA	NA	NA	NA	2.82	1.65	2,748,021	1,084,466	112,060,795	109,49
0	94.82	94.53	4.43	3.72	4.20	3.51	3,659,100	2,676,815	85,691,111	83,39
7	91.07	93.93	5.62	3.99	5.12	3.75	4,350,000	3,175,000	70,532,545	64,60
7	103.83	102.14	3.72	4.45	3.86	4.54	1,675,000	1,837,793	29,793,012	23,99
8	79.63	88.08	6.62	4.41	5.27	3.88	2,370,000	880,000	27,089,395	24,26
7	77.65	76.62	7.11	5.50	5.52	4.02	5,811,000	4,225,000	67,948,117	48,57
5	96.49	81.81	7.76	4.35	7.48	3.56	2,842,000	1,238,000	32,782,558	21,98
0	12.56	16.24	25.64*	14.12*	3.22*	2.29*	None	None	20,521,125	23,48
7	93.14	82.82	14.78	14.60	13.77	12.09	4,601,358	4,068,068	68,422,073	52,49
4	87.34	86.99	5.11	4.10	4.47	3.56	1,200,000	890,000	18,613,872	17,85
8	85.32	88.35	6.36	4.96	5.42	4.38	1,165,000	956,913	15,207,422	12,75
1	98.84	95.42	13.94	16.19	13.78	15.45	2,060,598	2,458,436	21,815,621	16,89
	NA	NA	NA	NA	NA	NA	1,600,100	1,800,000	22,751,173	15,78
	[25]	[25]	[25]	[25]	[25]	[25]	1,590,000	1,200,000	25,062,181	23,02
	NA	NA	NA	NA	NA	NA	3,414,500	1,179,500	23,741,758	21,97
5	89.62	81.32	6.46	7.40	5.79	6.02	1,180,000	1,319,000	9,248,930	7,07
6	94.50	79.04	10.08	4.48	7.34	3.54	1,500,000	544,000	7,398,795	5,85
2	68.47[23]	68.55	30.31	44.77[22]	20.75[23]	30.69[22]	944,892	1,543,040	17,605,979	17,16
1	98.15	101.06	6.96	5.91	6.84	5.98	2,600,000	2,358,000	27,272,452	23,14
	NA	NA	[21]	[21]	[21]	[21]	2,048,177	1,104,565	25,152,678	21,58
2	**94.39**	**92.93**	**$6.24**	**$4.99**	**$6.07**	**$4.71**	$376,480,184	$268,774,966	$6,558,017,277	$5,716,60

[24] Fiscal year ended Sept. 30.
[25] Not applicable as company's principal business is wrought iron.
[26] Does not include $54,300 as value of retired stock held in treasury and $25,000 as stock subscribed but not issued.
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1928.....	6.55	1934.....	0.36	1941.....	7.87	
1929.....	9.88	1935.....	2.09	1942.....	5.69	
1930.....	4.54	1936.....	4.40	1943.....	5.22	
1931.....	0.40	1937.....	6.07	1944.....	5.02	
1932.....	*2.85	1938.....	0.59	1945.....	5.24	
1933.....	*0.90	1939.....	4.27	1946.....	6.51	
* Loss		1940.....	7.57	1947.....	9.49	
				1948.....	10.73	

otal Income alization 1947	Net Sales 1948	Net Sales 1947	Net Profit Margin Per Cent 1948	Net Profit Margin Per Cent 1947	Net Income Before Dividends 1948	Net Income Before Dividends 1947	
8.16	$2,481,508,535	$2,122,786,243	5.22	5.99	$129,627,845	$127,098,148	United States Steel Corp.
7.93	1,315,188,536	1,034,856,444	6.87	4.93	90,347,560	51,088,375	Bethlehem Steel Corp.
9.00	766,400,960	645,328,877	6.06	4.81	46,438,382	31,018,410	Republic Steel Corp.
7.04	446,057,301	350,132,366	7.00	5.49	31,222,451	19,225,184	Jones & Laughlin Steel Corp.
12.72	381,742,264	308,571,405	9.35	8.52	35,711,732[4]	26,299,923[4]	Youngstown Sheet & Tube Co.
11.71	436,522,051	328,957,189	9.19	8.16	40,121,506	26,838,788	National Steel Corp.
16.31	394,715,858	316,215,642	9.83	9.49	38,606,898[7]	29,888,558[7]	Inland Steel Co.
13.27	382,563,811	311,685,322	8.37	8.02	32,030,712	25,002,211	Armco Steel Corp.
7.52	154,953,406	131,721,128	9.71	8.85	15,050,045	11,651,579	Wheeling Steel Corp.
3.22	131,360,030	110,503,836	2.74	1.87	3,596,177	2,064,887	Crucible Steel Co. of America
8.92	118,858,896	94,740,442	5.20	5.37	6,181,777	5,088,676	[10]Colorado Fuel & Iron Corp.
9.08	102,852,785	85,873,538	5.33	4.68	5,484,090	4,019,637	Pittsburgh Steel Co.
17.82	61,460,919	52,773,066	3.92	5.37	2,411,604	2,835,702	[13]Lukens Steel Co.
15.82	41,380,694	25,869,719	7.90	7.51	3,267,707[14]	1,941,899	Granite City Steel Co.
20.09	118,849,560	94,130,807	7.77	7.14	9,234,983	6,722,019	Sharon Steel Corp.
11.36	47,480,574	35,971,661	8.67	5.44	4,116,444	1,955,446	Alan Wood Steel Co.
5.80*	10,509,015	14,829,373	15.85*	8.00*	1,665,718*	1,186,727*	Midvale Co.
15.11	126,780,255	106,783,183	5.39	5.62	6,833,384	6,002,657	Allegheny Ludlum Steel Corp.
9.32	29,743,309	27,086,139	5.46	4.79	1,625,150	1,296,874	Continental Steel Corp.
15.49	34,072,411	26,283,120	5.19	5.44	1,767,863	1,429,035	Laclede Steel Co.
36.09	34,504,429	31,573,658	12.08	14.80	4,167,550	4,672,934	Keystone Steel & Wire Co.
24.28	36,739,240	28,715,064	6.37	9.90	2,339,996	2,841,568	[17]Follansbee Steel Corp.
9.12	31,760,743	25,076,633	7.35	6.73	2,331,034	1,685,093	[24]A. M. Byers Co.
11.03[19]	75,570,115	53,303,245	6.60[19]	2.90[19]	4,989,019[19]	1,546,711[19]	Copperweld Steel Co.
41.33	26,641,518	21,185,519	6.98	9.12	1,858,790	1,932,747	[20]Northwestern Steel & Wire Co.
21.30	18,940,250	16,500,149	13.18	5.47	2,496,859	903,360	Rotary Electric Steel Co.
17.67[22]	22,433,568	23,960,059	6.93	9.59[22]	1,553,783	2,298,071[22]	[19]Carpenter Steel Co.
24.04	58,904,663	49,459,952	7.66	7.98	4,511,550	3,944,969	Portsmouth Steel Corp.
16.48	51,257,671	41,365,948	5.10	4.08	2,615,270	1,689,213	[29]Barium Steel Corp.
9.49	$7,888,495,696	$6,474,873,779	6.67	6.18	$526,259,173	$400,106,734	Total (or average)

tal Assets 1947	Current Assets 1948	Current Assets 1947	Current Liabilities 1948	Current Liabilities 1947	Ratio of Current Assets to Current Liabilities 1948	Ratio of Current Assets to Current Liabilities 1947	
6 $2,136,424,065	$974,361,251	$964,993,485	$504,855,814	$416,345,387	1.93—1	2.32—1	United States Steel Corp.
7 948,570,613	505,596,791	485,886,595	224,952,249	195,771,625	2.25—1	2.48—1	Bethlehem Steel Corp.
1 455,060,571	227,082,058	196,021,638	78,448,966	71,504,577	2.89—1	2.74—1	Republic Steel Corp.
0 341,328,755	170,522,706	137,369,641	63,135,628	48,533,258	2.70—1	2.83—1	Jones & Laughlin Steel Corp.
7 277,510,221	202,688,266	167,412,208	53,602,411	48,058,121	3.78—1	3.48—1	Youngstown Sheet & Tube Co.
9 292,361,297	139,008,084	106,900,893	40,845,736	33,529,718	3.40—1	3.19—1	National Steel Corp.
3 243,724,217	158,638,518	137,089,385	37,362,528	32,185,473	4.25—1	4.26—1	Inland Steel Co.
2 248,791,869	168,448,951	122,087,231	55,915,670	45,265,366	3.01—1	2.70—1	Armco Steel Corp.
8 159,016,970	70,298,872	65,170,519	13,910,444	12,391,995	5.05—1	5.26—1	Wheeling Steel Corp.
5 109,499,530	49,960,614	50,801,960	17,418,719	18,329,538	2.87—1	2.77—1	Crucible Steel Co. of America
1 83,391,168	35,961,933	35,940,352	16,867,352	18,722,527	2.13—1	1.92—1	[10]Colorado Fuel & Iron Corp.
5 64,608,277	37,658,005	34,132,401	14,107,138	13,381,936	2.67—1	2.55—1	Pittsburgh Steel Co.
2 23,990,231	18,627,058	14,049,684	9,687,707	6,724,841	1.92—1	2.09—1	[13]Lukens Steel Co.
5 24,260,095	13,255,045	10,578,760	6,350,263	5,263,820	2.09—1	2.01—1	Granite City Steel Co.
7 48,570,231	44,197,032	33,185,462	19,422,537	14,585,560	2.28—1	2.28—1	Sharon Steel Corp.
8 21,981,691	12,964,388	10,375,200	6,519,920	4,267,496	1.99—1	2.43—1	Alan Wood Steel Co.
5 23,486,462	13,863,127	16,902,710	1,428,165	1,683,455	9.71—1	10.04—1	Midvale Co.
3 52,491,502	42,497,279	32,079,557	12,592,714	11,233,298	3.37—1	2.86—1	Allegheny Ludlum Steel Corp.
2 17,858,538	10,294,007	9,669,690	2,920,402	3,360,176	3.52—1	2.88—1	Continental Steel Corp.
2 12,750,515	8,769,308	7,069,230	3,763,918	2,300,171	2.33—1	3.07—1	Laclede Steel Co.
1 16,899,490	11,569,164	7,573,709	6,331,355	3,725,369	1.83—1	2.03—1	Keystone Steel & Wire Co.
3 15,782,564	13,462,949	10,056,195	5,785,730	3,804,403	2.33—1	2.64—1	[17]Follansbee Steel Corp.
1 23,022,766	11,965,661	10,084,663	4,587,983	4,245,427	2.61—1	2.38—1	[24]A. M. Byers Co.
8 21,973,658	16,617,911	15,670,169	8,048,469	6,500,153	2.06—1	2.41—1	Copperweld Steel Co.
0 7,075,743	5,356,107	3,466,731	3,209,413	1,898,877	1.67—1	1.83—1	[20]Northwestern Steel & Wire Co.
5 5,855,108	3,661,564	4,216,648	1,317,558	1,385,917	2.78—1	3.04—1	Rotary Electric Steel Co.
9 17,167,735	11,982,408	12,269,136	3,248,983	3,487,095	3.69—1	3.52—1	[19]Carpenter Steel Co.
2 23,147,056	17,194,942	15,510,335	7,833,354	6,627,794	2.19—1	2.34—1	Portsmouth Steel Corp.
3 21,586,769	13,820,754	12,063,001	8,789,343	8,324,439	1.57—1	1.45—1	[29]Barium Steel Corp.
7 $5,716,600,938	$2,996,503,999	$2,716,564,187	$1,224,471,126	$1,035,113,373	2.45—1	2.62—1	Total (or average)

PER CENT EARNED ON SALES

1937.....	6.87	1943.....	2.79
1938.....	*0.44	1944.....	2.68
1939.....	5.66	1945.....	3.06
1940.....	7.48	1946.....	5.46
1941.....	5.44	1947.....	6.18
1942.....	3.46	1948.....	6.67

* Loss

e Steel Industry for 1948

enting More Than 92 Per Cent of Steelmaking Capacity

	Capitalization Per Ton Ingot Capacity		Provision for Depreciation and Depletion		Total Income Before Dividends and Interest on Bonds		Per Cent Total of Capitaliz
	1948	1947	1948	1947	1948	1947	1948
0	$60.85	$50.90	$145,986,681[1]	$114,045,483[1]	$132,022,190	$129,605,877	6.93
2	55.58	53.43	30,222,602	25,463,456	93,864,061	54,629,448	12.24
9	46.24	43.06	23,016,740[2]	18,901,535[2]	48,596,406	33,308,777	12.22
1	64.62	60.83	16,131,249	13,193,133	32,872,451	20,287,584	10.56
7	58.61	53.28	11,511,049	10,499,976	36,536,732	27,124,923	15.58
6	66.37	61.50	21,506,270[5]	12,853,292[5]	41,378,649	28,095,931	15.39
4	68.03	56.47	8,285,338	7,932,076	40,246,673[7]	31,316,142[7]	17.40
3	71.76	58.36	8,161,074	6,951,619	33,855,670	26,077,023	13.24
6	110.40	102.64	5,390,827[9]	4,877,727[9]	14,311,516	10,878,696	9.20
0	73.15	71.80	2,477,594	2,159,519	4,395,346	2,891,207	4.70
3	45.48	41.64	3,204,745	2,726,350	6,508,776	5,381,223	9.72
9	49.89	45.12	1,924,922	1,813,965[11]	5,798,587	4,393,635	10.84
9	30.10	25.50	1,047,539	999,558	2,459,052	2,835,702	13.09
3	31.61	36.98	1,010,998	887,611	3,394,533[14]	2,926,094	17.32
1	29.02	20.33	1,965,726	1,470,495	9,468,872	6,829,010	19.51
1	46.80	31.29	1,228,884	903,587	4,196,944	1,955,446	16.31
1	34.28	39.53	520,000	520,000	1,665,718*	[28]1,186,727*	9.39*
1	108.93	80.06	2,009,786	1,635,919	6,833,384	6,002,657	12.64
3	41.47	38.21	493,501	490,855	1,625,150	1,296,874	10.77
3	32.60	29.78	568,901	481,549	1,842,082	1,504,035	17.33
6	50.84	43.26	420,052	388,329	4,214,425	4,721,453	27.41
9	107.47	83.97	624,118	396,839	2,339,996	2,877,550	15.43
1	[29]	[29]	916,817	833,326	2,331,034	1,685,093	11.59
5	[18]	[18]	795,591	637,961	5,184,764[19]	1,630,703[19]	37.53[19]
6	17.26	14.57	197,522	180,670	1,858,790	1,932,747	33.56
1	17.89	17.53	167,074	140,472	2,524,479	951,845	41.51
6	182.71	173.65	328,936	285,872	1,553,783	2,298,071[22]	11.36
2	29.24	24.87	1,268,183	805,025	4,511,550	3,944,969	23.37
6	[21]	[21]	516,037	395,667	2,615,270	1,689,213	20.83
8	$58.59	$51.77	$291,382,719	$232,476,199	$543,060,177	$416,195,988	10.73

	Steel Operating Rate Per Cent		Net Income Per Ton Ingots Produced		Net Income Per Ton Ingot Capacity		Federal Income Taxes		Total
	1948	1947	1948	1947	1948	1947	1948	1947	1948
0	93.80	96.70	$4.42	$4.44	$4.14	$4.07	$109,000,000	$91,000,000	$2,534,971,836
0	97.18	99.28	6.74	3.99	6.55	3.96	57,225,000	31,000,000	1,029,000,177
0	96.79	92.87	5.58	3.88	5.40	3.61	34,000,000	23,250,000	489,086,371
7	96.23	95.36	6.74	4.25	6.48	4.06	18,950,000	11,482,000	379,117,410
3	99.10	98.93	9.00[4]	6.64[4]	8.92[4]	6.57[4]	25,400,000	16,635,000	311,677,377
	NA	NA	NA	NA	9.91	6.88	33,300,000	19,270,000	329,884,289
8	103.92	97.04	10.93	9.06	11.35	8.79	23,221,000	18,485,000	292,821,723
7	93.52	91.43	9.61	8.12	8.99	7.43	20,072,015	16,464,876	316,203,962
2	92.51	91.26	11.55	9.06	10.68	8.27	10,000,000	7,754,059	171,695,218
	NA	NA	NA	NA	2.82	1.65	2,748,021	1,084,466	112,060,795
0	94.82	94.53	4.43	3.72	4.20	3.51	3,659,100	2,676,815	85,691,111
7	91.07	93.93	5.62	3.99	5.12	3.75	4,350,000	3,175,000	70,532,545
7	103.83	102.14	3.72	4.45	3.86	4.54	1,675,000	1,837,793	29,793,012
8	79.63	88.08	6.62	4.41	5.27	3.88	2,370,000	880,000	27,089,395
7	77.65	76.62	7.11	5.50	5.52	4.02	5,811,000	4,225,000	67,948,117
5	96.49	81.81	7.76	4.35	7.48	3.56	2,842,000	1,238,000	32,782,558
0	12.56	16.24	25.64*	14.12*	3.22*	2.29*	None	None	20,521,125
7	93.14	82.82	14.78	14.60	13.77	12.09	4,601,358	4,068,068	68,422,073
4	87.34	86.99	5.11	4.10	4.47	3.56	1,200,000	890,000	18,613,872
8	85.32	88.35	6.36	4.96	5.42	4.38	1,165,000	956,913	15,207,422
1	98.84	95.42	13.94	16.19	13.78	15.45	2,060,598	2,458,436	21,815,621
	NA [25]	NA [25]	NA [25]	NA [25]	NA [25]	NA [25]	1,600,100	1,800,000	22,751,173
							1,590,000	1,200,000	25,062,181
	NA	NA	NA	NA	NA	NA	3,414,500	1,179,500	23,741,758
5	89.62	81.32	6.46	7.40	5.79	6.02	1,180,000	1,319,000	9,248,930
6	94.50	79.04	10.08	4.48	7.34	3.54	1,500,000	544,000	7,398,795
2	68.47[23]	68.55	30.31	44.77[22]	20.75[23]	30.69[22]	944,892	1,543,040	17,605,979
1	98.15	101.06	6.96	5.91	6.84	5.98	2,600,000	2,358,000	27,272,452
	NA	NA	[21]	[21]	[21]	[21]	2,048,177	1,104,565	25,152,678
2	94.39	92.93	$6.24	$4.99	$6.07	$4.71	$376,480,184	$268,774,966	$6,558,017,277

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* Loss		1940.....	7.57	1947.....	9.49
				1948.....	10.73

Renegotiation Guides

To be followed by armed services in recapturing excessive profits on defense contracts

NATIONAL Military Establishment has just made public guides to be followed by the armed services in recapturing excessive profits from military contracts which are subject to the Renegotiation Act of 1948. These rules, given in part 424, "Determination and Elimination of Excessive Profits," are in addition to the military renegotiation regulation which sets uniform standards for use by the services in contract renegotiation.

Contracts for aircraft and aircraft parts are among those subject to renegotiation under the 1948 act, which also applies to several other types of contracts authorized by the 1948 National Defense Supplemental Appropriation Act.

Some of the principal features of the new part are:

1. The amount of excessive profits is to be determined before provision for federal income taxes.

2. Special attention will be given cost-plus fixed fee contracts, and contracts which contain incentive provisions, or provide for revision of price during the life of the contract.

3. Renegotiation settlements for the war years will have no bearing on settlements for the years covered by the 1948 Renegotiation Act.

4. The contractor will not be penalized for setting up reserves as a contingency against possible renegotiation settlements.

5. A contractor will not be allowed to retain excessive profits because he lacks adequate working capital.

6. Decisions as to excessive profits will be made on an individual case basis, rather than by rigid formula.

7. Good management will be rewarded. Contractors who sell at lower prices and produce at lower costs, as a result of efficient management, improved production methods, and good fiscal practices, will be allowed to retain more profits than those who do not.

8. Consideration will be given to the effect of volume on costs and profits, and the government should receive the principal benefit when a contractor attains a high business volume with resulting lower unit costs, due to large military orders.

9. The amount of risk assumed by the contractor such as possible increase in cost of materials and wages, delays in getting materials, etc., will be taken into account.

Other sections of the part deal with recovery of excessive profits already realized, renegotiation and taxes.

Corrosion Work Jeopardized?

FROM the standpoint of industry, inclusion of the inter-service Deterioration Prevention Committee among the nine boards and committees abolished by the new secretary of defense Louis A. Johnson raises the question whether the committee's drive against damage to metal fabrications through various types of corrosion may lose some of its impetus. Work of the committee now is among the many responsibilities of the Research and Development Board.

Army Goes on Diet

TO ENABLE designers to reduce to minimum the weight of weapons and other military materiel, so as to keep down the burden upon foot soldiers and air transport, the Army Ordnance has broadened its study of the strength-weight ratio of available materials by embarking on a full investigation of titanium and titanium alloys. This raises to four the metal groups thus being studied, the other three being steel and its alloys, aluminum and its alloys, and magnesium and its alloys. The study in general is concerned with the metals in relatively heavy sections.

In the titanium investigation, Bureau of Mines will produce binary alloys of titanium with copper, cobalt, iron and nickel and study their characteristics; New York University is studying the possibilities of alloying titanium with carbon and nitrogen; and under an arrangement now under discussion the California Institute of Technology will study the possibilities for producing binary alloys of titanium with tungsten, molybdenum, columbium, chromium, vanadium and tantalum.

Study Brittleness—Work on the steel investigation, at Watertown Arsenal and Pennsylvania State College is being pursued to find the causes of the brittleness which characteristically occurs in connection with steels of very high strengths. In a companion program, at Battelle Memorial Institute, high-strength steel plates ¾ and 1-inch thick are being joined with welds of the same strength as the steel; welded joints running over 120,000 pounds per square inch yield strength have been obtained consistently with steel of the same yield strength. The latter program seeks improved shock resistance.

The investigation of aluminum alloys to determine which have maximum shock resistance in combination with high strength continues to be pushed by Case Institute of Technology. Dow Chemical Co. has a similar study on magnesium alloys.

Entire program is under the auspices of Ordnance's Research & Materials Branch, Research & Development Division.

CALENDAR OF MEETINGS

Apr. 25, International Acetylene Association: Meeting, Hotel William Penn, Pittsburgh. Association headquarters are at 30 E. 42nd St., New York.

Apr. 25-27, Radio Manufacturers Association and Institute of Radio Engineers: Fourth annual spring meeting, Benjamin Franklin Hotel, Philadelphia.

Apr. 25-27, Triple Mill Supply Convention: Meeting headquarters at Hotel Cleveland, Cleveland; exhibit at Public Auditorium. Convention sponsored by American Supply & Machinery Manufacturers' Association and National and Southern Supply & Machinery Distributors' Associations.

Apr. 26, American Ordnance Association: 31st annual meeting, Hotel Ambassador, Los Angeles. Los Angeles committee has as its secretary Evan White, 2700 Tweedy Blvd., South Gate, Calif.

Apr. 26-27, Westinghouse Electric Corp.: Annual machine tool electrification forum, Statler Hotel, Buffalo.

May 2-3, Association of Iron & Steel Engineers: Annual spring conference sponsored by association's Rolling Mill Committee, Lord Baltimore Hotel, Baltimore. Group headquarters are at 1010 Empire Bldg., Pittsburgh.

May 2-4, American Society of Mechanical Engineers: Spring meeting, Mohican Hotel, New London, Conn.

May 2-5, American Foundrymen's Society: Foundry congress, St. Louis. Society headquarters are at 222 W. Adams St., Chicago.

May 4-7, Electrochemical Society: Spring meeting, Benjamin Franklin Hotel, Philadelphia. Society headquarters are at 235 W. 102nd St., New York.

May 5-6, American Society for Quality Control: Third annual convention, Copley Plaza Hotel, Boston. Society headquarters are at 4949 W. 65th St., Chicago.

May 9-10, National Association of Sheet Metal Distributors: Spring meeting, Deshler-Wallick Hotel, Columbus, O. Association headquarters are at 505 Arch St., Philadelphia.

May 9-11, Liquefied Petroleum Gas Association: Annual meeting, Palmer House, Chicago.

May 9-12, American Mining Congress: Coal convention and exposition, Public Auditorium, Cleveland.

May 10-13, American Management Association: National packaging exposition and conference on packaging, packing and shipping, Municipal Auditorium, Atlantic City, N. J. Association headquarters are at 330 W. 42nd St., New York.

May 11-13, National Welding Supply Association: Fifth annual convention, Hotel Gibson, Cincinnati. Association headquarters are at 505 Arch St., Philadelphia.

May 12-13, Instrument Society of America: Fourth annual spring meeting, Royal York Hotel, Toronto, Canada.

May 12-13, Rail Steel Bar Association: Annual meeting, Edgewater Beach Hotel, Chicago. Association headquarters are at 38 S. Dearborn St., Chicago.

May 13, American Institute of Electrical Engineers: Conference on electric equipment for materials handling bridges, Hotel Cleveland, Cleveland.

May 18, Bituminous Coal Research: Annual meeting, Columbus, O. Agency's headquarters are at 912 Oliver Bldg., Pittsburgh.

May 19-21, Society for Experimental Stress Analysis: Spring meeting, Hotel Statler, Detroit. Society address is Box 168, Central Square Station, Cambridge, Mass.

May 19-21, Automotive Engine Rebuilders Association: Annual convention, Baltimore. Association headquarters are at 415 N. Capital Ave., Indianapolis.

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Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Businessmen protest trend toward increased government spending, but fail to receive much recognition in Washington. Eighty-first Congress not economy-minded

MANUFACTURERS by the thousands have been writing the House Appropriations Committee, asking it to cut federal expenses; several batches of them have appeared in the appendix of the Congressional Record. Gist of the letters is that at the present rate of spending we are on the road to "national financial disaster," also that if businessmen followed a spending policy patterned after the government's they would wind up in bankruptcy.

The letters have had no noticeable effect; this is not an economy Congress.

Here is the score sheet for the big House-passed appropriation bills for fiscal 1950, compared with what the President asked for 1950 and, with what Congress appropriated for fiscal 1949:

	Approved by House for fiscal 1950	Requested by President for 1950	1949 appropriation
Treasury and Post Office	$3,072,817,904	$3,172,666,750	$2,545,392,680
State, Justice, Commerce	684,616,102	740,023,456	511,129,662
Labor and Federal Security Agency	2,211,794,085	2,235,065,685	1,857,955,310
Independent offices	7,104,571,603	7,775,566,830	6,787,102,402
Army Civil Functions	593,292,270	767,733,220	648,575,666
Agriculture	943,117,979	726,879,908	577,546,953
Interior	536,461,908	616,805,020	409,389,974
District of Columbia	98,923,621	103,321,427	99,879,483
Deficiencies	1,739,854,849	1,776,302,974	2,034,554,306
Defense	15,905,416,800	15,278,381,700	13,815,694,000
European Recovery	5,580,000,000	5,580,000,000	5,300,000,000

But the above figures do not tell the whole story. In addition to actual dollar appropriations, the bills contain hundreds of millions of dollars of contract authorizations for which funds will have to be found at a later date.

Fictitious Cuts—Many cuts which Congress made in the President's requests are questionable and probably will turn out to be fictitious. This is notably the case with respect to cuts made in anticipation of a 15 per cent drop in construction costs. The House Appropriations Committee told the affected departments and agencies that if this 15 per cent reduction in construction costs fails to materialize, they should come back for more money; the construction program itself was not reduced appreciably. Some cuts are due to nonrecurring items, as repatriation of war dead and a flood emergency fund in fiscal 1949. A hasty scrutiny reveals that federal employment is to mount further (it stood at 2,104,979 at end of February); the Treasury is empowered to take on 1430 additional employees in the coming fiscal year, the Interior Department 8000, etc.

Trend Is Upward—From what already has happened to some of these bills in the Senate, it is clear that the trend toward a bigger, costlier government at Washington has not been arrested; it continues to gain momentum. No change is in prospect—as long as the people can be made to support the trend; and members of Congress appear to think this is exactly what the people want.

"At every hearing," recently said Rep. Clarence Cannon, chairman of the House Appropriations Committee, "we are besieged by a large part of the membership of the House demanding huge expenditures in their respective districts. . . . and every member of the committee reporting the bill becomes anathema to colleagues whose pet projects have failed to measure up to. . . . admission in the bill.

"Eventually," he added, "we must pay the fiddler. Let no one have any illusions about that."

Co-ops Urge Steel Expansion

DRIVE for sharp expansion in steel producing capacity—by the steel industry if it is able and willing, and by the government if the steel industry is not able and willing—got another boost at the recent Economic Action Conference in Washington. This was a conference of representatives of farm, labor and co-operative organizations sponsored by the Cooperative League, U.S.A., Washington, of which Jerry Voorhis, former congressman from California, is executive secretary.

Following speeches by Louis Bean, Department of Agriculture, Otis Brubaker of the United Steelworkers, Harvey Brown, of the International Association of Machinists and Don Montgomery of the United Automobile Workers, the conference called for a thorough inquiry—under the administration's economic stability bill (H. R. 2756 introduced by Representative Spence)—"into steel industry capacity, its production methods, and the adequacy of present and planned expansion to meet the requirements of a fully-employed economy . . . with particular reference to authorizing government loans to increase plant capacity and government construction of plants if other means fail to meet our needs."

Want 110-115 Million Tons—Target is an immediate expansion to 110 to 115 million tons of ingot capacity with allowance for meeting increased steel needs at the rate of 3½ per cent a year.

Government action is needed, the conference voted, because future plans of the steel industry are based "not on the expectation of full employment and steadily rising national output, but on the belief that full employment is an abnormal condition and that unemployment and even business depressions can be expected to recur."

Co-operatives in Steel?—At the same time, it was reported that leaders of the co-operative movement are considering a proposal to enter the steel business. Co-operative leaders, said Murray D. Lincoln, president, Cooperative League, U.S.A., "have been looking at a plant which has been offered for sale and we are convinced that we would have a considerable source of iron ore with which to operate."

If the plant is bought, went on Mr. Lincoln, demands of co-operatives would take up all the steel that could be produced at the plant in question. It would be operated as a pilot plant; it would take a little time to determine if "we could offer steel at a lower price than the steel industry." If the plant proves successful, "we definitely would want to increase our activity in that field," said Mr. Lincoln. He went on to say that the co-operatives, as distributors of wire fence, roofing, farm machinery and refrigerators and other products, are a large and growing outlet for steel.

Welcomed with a friendly letter from President Truman, the conference was addressed by a number of

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A Roller Leveler and Rotary Drum Type Shear, (Utilizing Geneva Motion) are combined to produce cut to length strip from the coil.

Delivery Speed 120 feet per minute

Lengths are variable from 2 to 20 feet

Compact design minimizes floor space

Rugged construction insures continuous performance

Leveler capacity 16 gage to ⅛" thickness—SAE 1020 steel

Shear capacity 16 gage x 24" or ⅛" x 12"—SAE 1020 steel

Engineered for low cost high speed production.

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high government officials and by a number of liberal congressmen.

Encourage Private Tin Smelting

ENCOURAGEMENT of tin smelting by private companies is the objective of S. 1433, the Myers bill to authorize the Reconstruction Finance Corp. to sell tin concentrates to domestic industry. It would also authorize RFC to purchase at its full going price the tin produced from such concentrates by the buyers. Administration officials are behind it and Commerce Secretary Sawyer, testifying before the Senate Banking & Currency Committee, expressed the belief that the measure would promote private technical research and investment with the objective of "ultimately having a diversified domestic smelting industry owned and operated by private firms."

One of the beneficiaries would be the Vulcan Detinning Co., with plants at Sewaren, N. J., and Neville Island, Pa. Alfred C. Buttfield, Vulcan president, told the committee his company has a new process of recovering tin from Bolivian low-grade concentrates.

To committee members who wanted to know if the administration intends to sell to private parties the government tin smelter at Texas City, Mr. Sawyer said he did not think such a move was contemplated in the near future.

Ready Public Works Plans

A CAMPAIGN to build up a "reserve shelf" of plans and specifications for public works, so that public construction can be stepped up at any given time without delays, has been launched by Maj. Gen. Philip B. Fleming, Federal Works Agency administrator.

Public construction was deferred during the war years, and again in the immediate postwar period, he says, so that accumulated need for public works now is enormous. State and local needs—for highways, hospitals, conservation projects, schools, etc., he puts in the neighborhood of $100 billion. This does not include federal projects which could come to an additional $100 billion. Altogether, says General Fleming, at last year's expenditure of around $4 billion for public works, it would take at least 25 years to make up the deficit, not counting fresh needs that will develop in the meantime.

At present, he says, federal, state and local public work projects for which the blueprints are ready come to around $4.5—or only a small fraction of the needs. Other needs should be placed in the blueprint stage as soon as possible, he says, as a matter of sound, forward-looking public-construction policy.

WAA Hurries Liquidation

THE HUGE postwar enterprise known as the War Assets Administration is intensifying its plans to liquidate on June 30, the date on which, by recent act of Congress, it is to wind up its business. At its peak in November of 1946, WAA employed 59,000 people. Today the employees number 3750 and this will taper down to 2100 as the final day nears.

Latest statistics are: Altogether the WAA acquired property which originally cost the government $27.2 billion and it disposed of property that cost $25 billion; the prices it obtained for this property averaged 27.6 per cent of the government's original cost.

Sales continue to be made and property still on hand in the WAA inventory on June 30 will represent original government outlay of less than $1 billion. The unsold inventory as of that date is slated to be taken over by the Federal Works Agency which will be charged with the job of completing the liquidation. Recently the administration proposed that Congress create in the Federal Works Agency a Property Management Bureau to represent a merger of the WAA with the Treasury's Bureau of Federal Supply, but so far Congress has not acted on the plan.

Oppose Wage-Hour Revisions

GENERAL industry opposition to S. 653, the bill to revise the Fair Labor Standards Act of 1938, has been expressed to the subcommittee of the Senate Labor and Public Welfare Committee which has been holding hearings on the measure. The bill would:

1. Take enforcement out of the hands of the independent administrator and place it in the hands of the secretary of labor; 2. raise the minimum wage to 75 cents an hour and authorize the secretary to establish minimum wages up to $1 an hour for individual industries; 3. extend coverage of the act to activities affecting commerce, and by eliminating or restricting many existing exemptions; 4. authorize the secretary to issue binding interpretations and rules; 5. authorize the secretary to enter back-pay suits in behalf of employees in cases of default by employers, and 6. prohibit the employment of minors.

In addition, the bill would amend the Portal-to-Portal Act by establishing a 4-year statute of limitations instead of 2 years as now provided by that act, and transfer to the secretary of labor the authority vested in the wage-hour administrator by the Portal Act.

Raymond S. Smethurst, general counsel, National Association of Manufacturers, warned the subcommittee that the proposed revisions could have an "extremely serious impact upon the business economy of the nation as a whole."

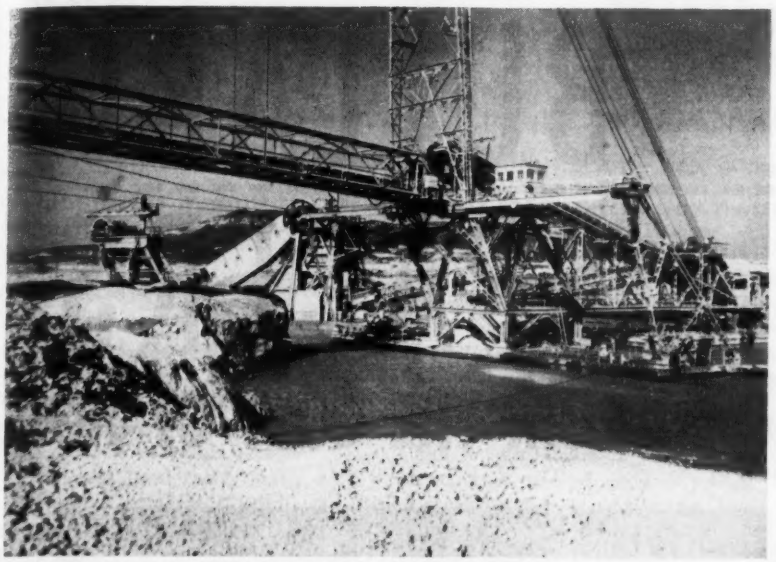
Said Mr. Smethurst: "The secretary of labor would have the power to define crimes, to prosecute persons he determines to be 'criminals' and have the courts fine and imprison them, and in addition, he, the secretary, could collect money damages from such 'criminals'."

The bill, if enacted, would compel the secretary to perform functions and duties of such conflicting nature that they cannot be reconciled, said Mr. Smethurst. "On the one hand," he said, "the secretary of labor is directed by the act creating the department to foster the interests of labor. On the other hand, under this proposal, he would be compelled to assume the duties of writing and enforcing 'laws' to virtually control employment conditions of all business throughout the nation."

RAYMOND S. SMETHURST

Steel Mill for Philippines

PLANS are under formulation for establishment of a steel mill in the Philippines according to *Bataan Magazine*, Washington publication devoted to Philippine progress. The National Economic Council at Manila has recommended to President Quirino a steel plant using scrap as raw material and having initial monthly output of 1500 tons of merchant bars and rods.



DREDGER: This is the first completed dredger for the huge French hydro-electric project on the Rhone. Five of these machines will be used. Conveyor belts deposit the dredged mud alongside the canal, where it will be used for dike construction. NEA photo

Ruhr Decisions Spur European Revival

ECA's capital expansion planning for Western Europe may proceed without detours now that the steel output ceiling has been lifted and dismantlings curtailed in Germany

EUROPE's bridge to economic recovery is nearer completion, with agreement at last by the major architects, United States, Great Britain and France, on the design and size of the keystone, Western Germany. Economic Cooperation Administration's capital expansion planning may finally proceed without cumbersome detours for all ERP-participating nations now that the steel production ceiling has been lifted and dismantlings curtailed in the Ruhr.

One sign of "full speed ahead" comes from ECA's announcement that it has approved projects for the modernization of steel manufacturing facilities in the United Kingdom, Austria and France, together with two aluminum facilities in France, which will obligate $29 million in ECA funds prior to June 30, with a long-range total of nearly $50 million. ECA has also agreed with France on the release of about $94 million from the French counterpart fund to finance French investments and reconstruction in electric power, coal mines, railroads, merchant marine, agriculture and colonial development. The administration has also authorized four projects involving some $19 million of ECA assistance funds for construction and modernization of power plants in Italy, Sicily, Denmark and the Netherlands.

Western Germany

ALLIES' new economic policy has brought a wave of optimism to Western Germany, optimism which is also based on new production records for the Ruhr.

More than 827,000 net tons of steel ingots were produced in March, a postwar record. Pig iron output mounted to 655,600 tons, and rolling mill production reached 567,310 tons, also postwar records. The sharpest increase occurred in sheets, a trend which is expected to continue.

Tempering the optimism are the realization that the new steel production ceiling cannot be achieved without vast capital expansions and the news that certain key plants will still be dismantled. Even to produce 11,770,000 net tons, the previous ceiling, Ruhr steel firms need an estimated $351 million for modernization and rehabilitation in 1949-50. The revised ceiling has been set at 12,210,000 tons, and output for 1949 will probably not exceed 9.9 million tons. Although all or parts of 159 German plants have been removed from the dismantling list, several units still will be torn down, notably the August Thyssen steelworks at Hamborn, one of the most modern mills in Western Europe.

Great Britain

ECA's largest steel project involves modernization of tin plate and sheet facilities in South Wales. ECA will provide about $17 million by June 30, with a long-range program of about $27 million, for the $240 million program for Steel Co. of Wales at Margam. About $27 million will be required for the purchase of rolling mill equipment and other special items in the U.S.

The United Kingdom's first quarter steel ingot output, at an annual rate of 17,449,600 net tons, established an all-time record. The first quarter rate in 1948 was 16,724,960 tons.

The increase in British market prices has not applied to export prices of plain steel, joists, sections and bars, but there has been a sharp advance in steel sheets for delivery abroad. For black sheets the advance is $16.80 per long ton, for galvanized sheets, $18.50. British iron and steel prices are now 70.7 per cent above 1938 levels; coal has risen 145 per cent; the average price boost on all commodities since 1938 has been 118.3 per cent.

France

ECA has approved two mills in France, a hot strip unit at Denain in northern France and close to the Lorraine iron mines, and a cold mill at Montataire, 35 miles north of Paris.

About $9 million of ECA funds to be committed prior to June 30 is involved in the project, with a long-range program of $12 million. The World Bank and the Export-Import Bank have even larger financial interests in these projects. ECA will also spend $825,000 for specialized equipment for each of two new aluminum foil plants, one at Rugles, near Le Havre, and the other at Froges, in northern France. Each of these two authorizations involves ECA funds of $1.1 million on a long-range program.

Austria

TWO projects in Austria, a slabbing and blooming mill at Linz, and a hot strip unit at the same location, have been approved by ECA and involve a total of $1,668,000 in ECA funds prior to June 30. The long-range program calls for ECA funds totaling $9,020,000.

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THE PRICE OF BULLARD SPACERS FROM THE COST OF JIGS

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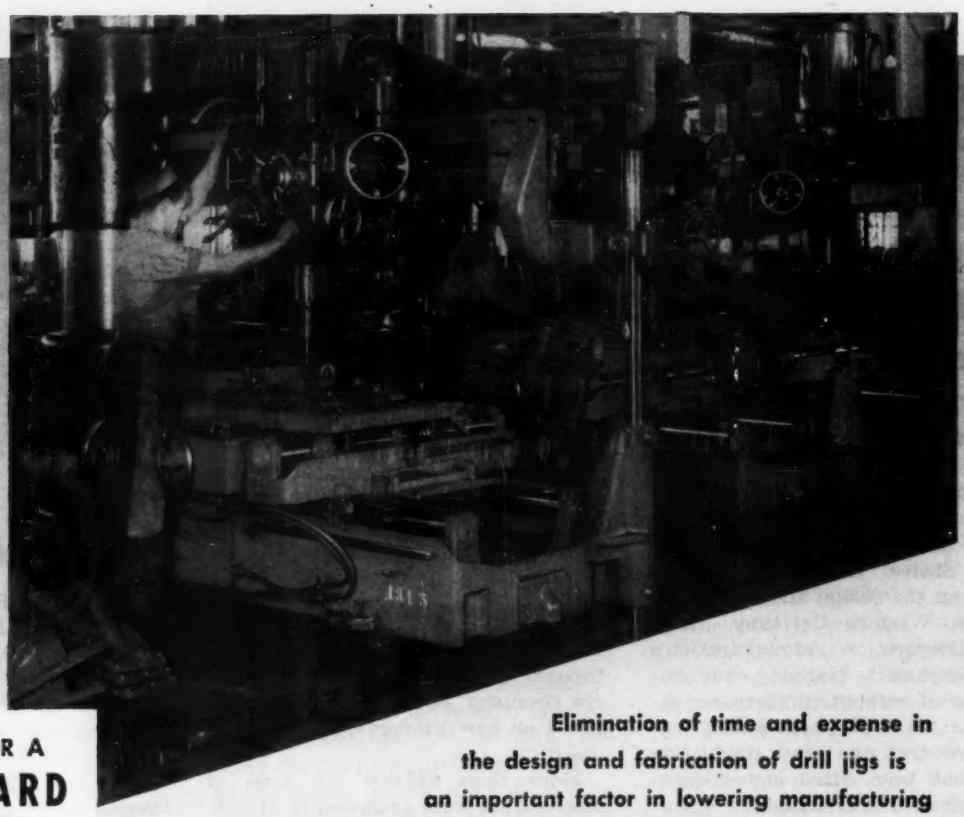

Elimination of time and expense in the design and fabrication of drill jigs is an important factor in lowering manufacturing costs. Maintenance and handling of jigs are also NON-PRODUCTIVE operations. The investment in a BULLARD SPACER is quickly absorbed . . .

QUOTE FROM ONE USER: **"We have completed some forty (40) different jobs. The amount of pieces of each job is about thirty (30). The cost of making jigs for each one of these jobs would amount to, from $300 to $500 per jig, plus special cutting tools to be used with jig drilling and boring."**

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THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Pressure on automotive suppliers to trim prices tightened as buyers realize they are in the saddle again. Screw machine parts manufacturers to adjust some prices downward

DETROIT

SUPPLIERS say pressure on prices from their automotive customers is being tightened up daily as buyers begin to realize they are back in the saddle again for the first time in eight years. The old angle of playing one source against another is being resumed generally, with apparently some success.

One of the first groups to crack has been screw machine parts manufacturers. These companies, mostly small in size and too numerous for their mutual good health, always have been quick to succumb to price pressure and they are no exception today. One supplier in this field, supplying five parts to a certain motor company, was asked to quote on 11 more. When the bids were all in and new orders placed, this interest found it still had the five original parts, and considered the result high good fortune in view of the intense competition which has developed for screw machine business.

Similar situations have developed among vendors of small stampings, molded plastics, and gray iron and malleable castings. There is little doubt the trend will continue and eventually cover the full range of auto industry sources.

Some Cut Prices—Several of the principal suppliers of screws are adjusting prices downward by 4½-6 per cent, effective May 1, not on all sizes but on many of the large-volume items purchased regularly in the millions by auto plants. They are squeezing this amount out of their prices, without realizing any savings on steel costs or knowing for certain what their labor bill may be after wage negotiations which will have to be weathered this summer.

The action is likely to spread to many other commodities bought by the automotive industry, for once a trend is started it usually snowballs rapidly. A certain result is added pressure on steel prices. Already reports are heard of steel companies waiving certain extras under customer pressure, although it is not considered likely any revision of basic steel prices can come before the third quarter.

Watch Autos, Steel—The economic outlook for United States industry, overall, is at the moment vitally tied to automobiles and steel. Any pronounced slump in auto production will be translated immediately to reduced steel operations and a sharp recession would be inevitable. That is why such a careful eye is being kept peeled on the motor industry. So far everything is rosy and production is pushing upward steadily to record high levels. Suppose, however, the UAW should go on the muscle and strike Ford plants (a strike vote was being conducted last week in protest over claimed assembly line speed-ups, any action would have to be authorized by international UAW officers) to pressurize demands in contract negotiations starting May 15. Many believe the result would be an immediate economic tailspin, for it would cut off 20 per cent of the industry in one whack and might quickly spread.

If, on the other hand, Walter Reuther and other UAW leaders can keep a check rein on the volatile elements in their crowd, it may well be the Ford negotiations will result in mutual agreement to postpone any decisions on pensions, insurance and wage adjustments for at least six months pending clarification of the economic weather. That would be the smart thing to do and would establish a pattern which the rest of the CIO could follow with no particular loss of prestige or power, meanwhile providing a breathing spell to discover which way business is going and how fast.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

January	445,092	422,236
February	443,734	399,471
March	543,927*	519,154
April		462,323
May		359,996
June		454,401
July		489,736
August		478,186
September		437,181
October		516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Apr. 2	119,088	105,132
Apr. 9	131,970	103,004
Apr. 16	133,335	104,761
Apr. 23	135,000	107,093

Estimated by Ward's Automotive Reports

What's Ahead in Autos?

CONSULTING engineer Robert B. Walder looks from his offices in the Fisher Bldg. in Detroit and sees the automobile industry getting set for a competitive struggle that will make the rugged prewar days look like kindergarten stuff. Active for a number of years in the fields of internal combustion engines, hydraulic and electronic apparatus and machine tools, he looks for many major changes in automobile design as well as in production methods in the next few years.

Chassis and body assembly work, he says, will be facilitated greatly by structural redesign and simplified styling. For instance, the intricate maze of wiring and pipelines (spaghetti and plumbing they call it in the aircraft industry) found under the hoods of today's cars to operate instruments and component equipment will be contracted drastically to permit easier handling and installation as a unit subassembly.

A new form of ribbon chrome trim will appear, adding to the smoothness of body contours. This narrower and more delicate trim will be "surface blended" by being set in flush with the flat or curved body steel.

Small, high-current "microlites," incorporated into the front grille nearer the radiator, will replace present large sealed-beam reflectors, reducing fender bulk forward and above the front wheels.

More Comfort for Driver—Driver comfort will be improved by the use of special springs and deep padding on the driver's side of the front seat.

Steering will be easier through the application of electronic graphical analysis methods to further the geometrical design and to extend the

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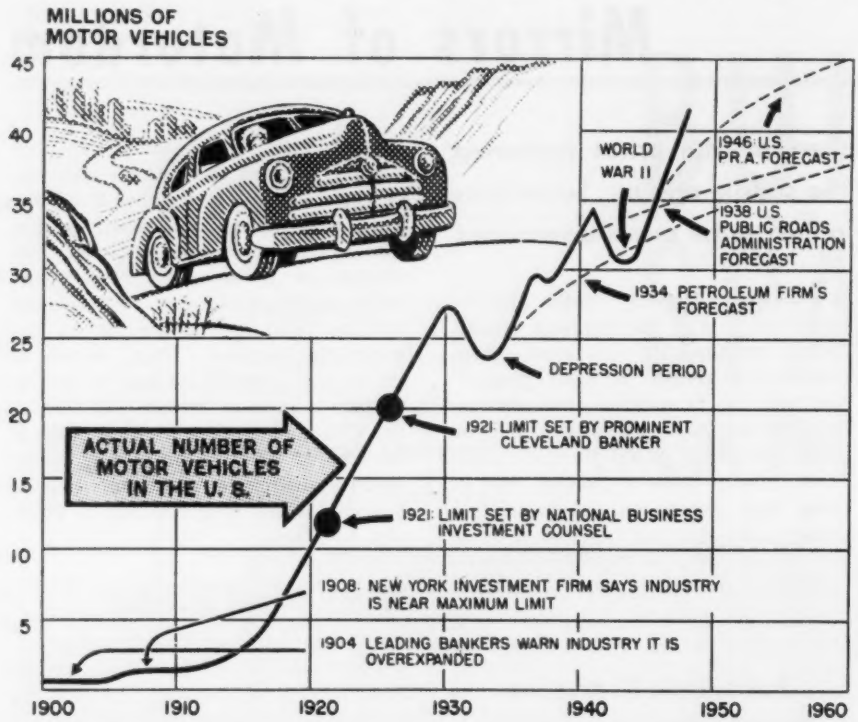

STUMPS EXPERTS: As it has for more than 45 years, motor vehicle ownership in the United States continues today to rise at a faster rate than predicted. About 41 million cars, trucks and busses are in operation in this country today, about 2 million more than the Public Roads Administration in 1946 expected to be in use by 1950. This chart shows the rise in number of automobiles and some of the erstwhile "predictions."
NEA chart

"tight life" factor, along with use of "servo" power to decrease manual effort.

Automatic window lifts will appear on even the lowest priced models, because of simplified electric and hydraulic mechanisms.

Automatic transmissions will be universal and will include an interesting development in design—the lowering of the output shaft to a point several inches below the crankshaft center line. This arrangement lowers the center line of the propeller shaft at its forward connection, permitting the body floor to be lowered without requiring bulky propeller shaft tunnels.

Cylinder displacement will be reduced appreciably, bettering gasoline mileage. Increased engine speeds and better gas flow in manifolds and through valve ports will maintain horsepower at present standards even with the smaller engines. The 4-cylinder engine with high volumetric efficiency will become popular in even medium-size cars. It will be a higher speed and more economical type than we have had to date.

The old-style contact-point type of distributor, often a major service headache, will be displaced by a "lifetime" distributor unit which will never lose its adjustment. And a coordinate duplex mechanism will bring true linear spark advance. Carburetion will step ahead by the use of a forced-pressure jet which atomizes the fuel particles.

Studebaker Builds Army Truck

STUDEBAKER engineers have crystallized some forward thinking in the design of a new 2½-ton, six-wheel drive military truck now being demonstrated to Army Ordnance. Serviceability and ease of maintenance have been emphasized particularly. For example, the grille guard, radiator, engine, clutch and transmission can be removed as a unit without detaching any sheet metal parts, facilitating test stand operations. Steering gear, clutch, brake pedals and master cylinder are located on the outside of the frame for easy accessibility. Clutch and brake pedals can be disassembled by removing one castellated nut at the outboard end of the pedal shaft, and all brake parts, wheels, hubs and bearings are interchangeable on both axles.

Wheelbase is only 146 inches instead of the 165 maximum allowed under government specifications. Equal load distribution on all wheels is accomplished by moving the engine forward, placing the oil pan sump in front.

Axles are all double-reduction, having a straightline drive of three propeller shafts to give high ground clearance. The result is fewer gears, bearings and shafts in the transfer case.

The undergeared front axle, coupled with a free-wheeling clutch, automatically controls the six-wheel drive on soft or wet ground as well as on steep grades. No manual control for front-axle operation is required.

Engine is mounted high in the chassis to give maximum accessibility, while the fan is mounted on the crankshaft to permit use of a lower radiator and thereby facilitate servicing of the engine compartment. Air for the engine, crankcase ventilation, 24-volt distributor ventilation, air compressor, master cylinder vent, gasoline tank vent and brake booster cylinder is filtered through a watertight air cleaner during normal operation and while fording streams. Water can be added to the radiator without lifting the hood, oil can be added by lowering the hinged hood side panel, a tire can be changed and the spare mounted under the frame by one man using a hoist which is part of the tire carrier.

Ford Builds in Mexico

FORD's Mexican subsidiary at Mexico City has started work on a $2 million building and expansion program leading to a 50 per cent increase in output of cars and trucks. Floor space will be increased from 240,000 to 451,000 sq ft, bringing annual capacity to 18,000 units on one shift.

Hudson Is 40 Years Old

FORTIETH anniversary of the Hudson Motor Car Co. was commemorated last Monday with a press conference followed by coast-to-coast radio speeches by officials. A. E. Barit, president, stated the buying potential of the American public currently is 50 per cent beyond what it was in 1940, and, with supply lines virtually filled, the salesman becomes the "man of the hour" who can translate this buying power into orders.

Incidentally, the company is still buying sheet bar on ingot conversion arrangements with Rotary Electric Steel Co. here but has trimmed schedules back to where they were last fall after increasing them in January and again in February. Termination of the setup by the end of the second quarter would not be a surprise, and it would involve suspending operations of the Valley Mfg. Co., subsidiary in Newcastle, Pa., where sheet bar is rolled into finished material.

Announcing

A NEW STEEL and INDUSTRIAL SUPPLY SERVICE in CLEVELAND

For many years the Tri-Boro Steel Supply Co. has provided quality steel products to manufacturers in the Metropolitan Area of New York from its complete warehouse stocks.

And now, it is with great pleasure that we announce a similar service for the great industrial area of the Midwest with Cleveland as its hub.

In addition, we have established a Mill Supply Division in Cleveland . . . stocking drill rods, drills, taps, dies, hack saw blades and other items.

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President

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Columbia To Cut Back

Commercial foundry operations to be discontinued at Pittsburg, Calif., by July 31

COLUMBIA Steel Co., a U. S. Steel subsidiary, which last year discontinued foundry operations at its Torrance plant in southern California, has announced a similar step at its Pittsburg mill in northern California. No change will be made in steel-producing units.

Foundry operations probably will be terminated by July 31, after completion of all present commercial commitments. As many as possible of the 308 foundry workers will be absorbed into other operations.

In explaining its action, the company said: "Columbia Steel is primarily a producer of rolled steel products. We have given the foundry situation long and careful study before reaching a conclusion to abandon production of castings for commercial sale. We are considering the advisability of continuing production of foundry castings for our own use. Should this be deemed advantageous, the foundry will continue to operate in a limited way."

The Pittsburg plant employs 4300.

ORDNANCE GAGING: At a meeting of the executive committee, Gage Industry Division, American Ordnance Association, at Wright-Patterson Field, Dayton, O., about 50 gaging experts representing industry, the Air Corps, Army and Navy met to discuss ordnance gaging problems. One feature of the session was a flight line demonstration by the Air Corps. Left to right: Col. W. E. Becker, commanding officer, Frankford Arsenal, Philadelphia; Brig. Gen. B. O. Lewis (ret.), staff consultant, American Ordnance Association; Louis Polk, president, Sheffield Corp., and chairman of the committee; Capt. A. D. Blackledge, USN, Commanding Officer, Naval Ordnance Plant, Indianapolis; and Col. H. B. Hambleton (ret.), gage expert, formerly on the staff of Chief of Ordnance

Leece-Neville To Expand

LEECE-Neville Co., Cleveland, manufacturer of electrical equipment for the automotive, aviation, marine and diesel industries, has sold its plant at 5363 Hamilton Ave. and will expand its two other facilities at 5109 Hamilton and 5351 Hamilton, Cleveland.

In announcing the expansion program, S. Floyd Stewart, company president, said the firm's sales were good during the first six months of the current fiscal year, and if continuing on a like basis should at least equal last year's $4,578,635.

Expanding Market for Closures

EXPANDING market for a unique closure is being explored by Magneseal Co., Chicago, which believes the product has potentialities for use far beyond its present applications. Justification for this belief is seen in the recent adoption of the closure by a major paint manufacturer, which, under Magneseal license, is now producing the resealable can top in quantity.

The company is now readying machinery to produce closures in a wider range of sizes and designs for cans, bottles, jars and drums. Possible uses include packaging of war materiel, food containers for solids and liquids, home canning for which use stainless steel cans and closures are under consideration, as well as countless others.

Operating on both vacuum and pressure-seal principles and available in either one or two-piece types, the closure consists of an inner cap equipped with a number of spring-grip fingers which close underneath the beading of a container and a sliding ring which tightens these fingers and prevents removal of the cap.

Contract Firms Affiliate

WESTERN Manufacturers, Associated, has been formed in Los Angeles by 20 contract manufacturers who affiliated to increase efficiency. President is Martin Lovequist of Lovequist Engineering Co.; W. R. Emmick of Walton Tool & Die Co. is treasurer; and Norman Lynn of Lynn-Western Inc. is secretary.

Each plant is in one of 20 different manufacturing categories. Within the WMA organization are the following facilities: Broaching, deburring, die casting, gear cutting, grinding, grinding—tool and cutter, foundry—patterns and sand castings, foundry-gray iron, heat treating, machining-experimental, machining-production, machining-screw machine, machining-Swiss automatic, plastics, sheet metal fabrication, special machinery-design and production, punch press stampings, welding.

Through the association, the manufacturing members also have access to specialists in engineering design, methods and industrial engineering and sales methods.

Pacific States Steel Expanding

PACIFIC States Steel Corp., Niles, Calif., has completed construction of a 26-in. structural mill and it plans to roll the first sections some time this month. By early next fall the company expects to be rolling a complete range of sizes up to and including 14-in. channels.

Meantime, work is progressing on the four new open hearths which Pacific States is erecting at Niles. The first heat is scheduled to be poured Aug. 1.

American Forge Co. also has completed its new plant adjoining the Pacific States mill at Niles.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Oakland Dock & Warehouse Co., Oakland, Calif., has purchased the government-built shipyard adjoining Moore Drydock Co. on the Oakland Estuary for $1,201,500. Oakland Dock, a newly formed firm, will engage in ship repair and outfitting.

—o—

Lane Clautice Engineering Co., manufacturer of bakery equipment and other products, has moved from 518 Light St. into larger quarters at 2800 Sisson St., Baltimore.

—o—

Tinnerman Products Inc., Cleveland, maker of fasteners, has moved its New York district office from 620 Lexington Ave. to larger quarters at 75 Roseville Ave., Newark, N. J. R. M. Negley is in charge.

—o—

Youngstown Foundry & Machine Co., Youngstown, manufacturer of steel mill rolls, machine castings and other steel mill products, has been licensed by International Nickel Co. to use its process of making magnesium-coated cast iron.

—o—

Permanente Products Co., Oakland, Calif., sales affiliate of Permanente Metals Corp., producer of aluminum, has opened a sales office in the Boston Safe Deposit & Trust Co. Bldg., Boston, to serve the New England area. Robert E. Belknap Jr. heads the office.

—o—

Washington Aluminum Co. Inc., maker of aluminum fabricated items, has moved from 4301 E. Lafayette St. into a larger building at Main and Maryland Aves., Turner's Station, Baltimore.

—o—

Ward Leonard Electric Co., producer of electric controls, has moved general offices from its factory building at 31 South St. to a new structure at 115 S. Macquesen Pkwy., Mount Vernon, N. Y.

—o—

Mettler Machine Tool Inc., New Haven, Conn., has begun production of a line of wire straightening machinery produced by the former F. B. Shuster Mfg. Co., New Haven, which was acquired by Mettler last August.

—o—

MacMen Inc., Los Angeles, has been newly organized to install major equipment for any type of plant.

—o—

C. C. **Bradley & Sor,** Syracuse, N. Y., metal goods manufacturer, and Edlund Machinery Corp., Cortland, N. Y., have merged to form Bradley-Edlund Corp. William J. During is president.

—o—

American Steel & Wire Co., Cleveland, a U. S. Steel Corp. subsidiary, has engaged the services of Weather Advisors Inc., Boston, to assist in efforts to anticipate the recurrence of any similar weather conditions which prevailed in the Donora, Pa., area at the time of the smog tragedy last October.

—o—

Colorado Fuel & Iron Corp., Denver, has disposed of its stock holdings in Granite City Steel Co., Granite City, Ill.

—o—

White Motor Co., Cleveland, has introduced a new series of trucks with design changes—the most striking being a power-lift cab—to increase payload and reduce maintenance costs. Introduction of the line, on Apr. 20, was timed with White's 50th anniversary observance.

—o—

C. H. Spragg & Son and **Maust Coal & Coke Co.,** both of New York, have won contracts to supply heavy coking coal to the Japanese Board of Trade. Spragg will ship 200,000 tons from Hampton Roads, Va., and Maust's contract calls for 160,000 tons, to be shipped via Baltimore.

—o—

Gray Iron Founders' Society, Cleveland, has published a revised "Basic Cost Manual for Gray Iron Foundries." Sections of the manual are devoted to a graphic description of the basic cost system, instructions to the bookkeeper and an explanation of how to use the cost system.

—o—

York Corp., York, Pa., manufacturer of refrigeration and air conditioning equipment, has organized a National Distributor Sales Advisory Committee whose purpose is to give key distributors the opportunity to present to York management plans for improving any phase of the distributors' business and their relations with the corporation and customers.

—o—

Canadian vessels, under Public Law 26 recently signed by President Truman, again are authorized to carry iron ore on the Great Lakes between United States and Canadian ports during the 1949 season.

—o—

Marcus Transformer Co. Inc., Hillside, N. J., has appointed Electrical Apparatus Co., Boston, as its representative for the New England area.

—o—

Igoe Bros., with warehouses in Brooklyn, N. Y., and Newark, N. J., for distribution of reinforcing steel, heavy hardware and other building materials, have contracted Walter Kidde Constructors Inc., New York, to erect a new warehouse at Plainville, Conn., to serve the Connecticut and southern Massachusetts area.

—o—

U. S. Geological Survey is organizing a new coal geology laboratory at Ohio State University, Columbus, O., to begin operations next summer.

—o—

Christopher Williams & Co. Inc. has been formed at 923 Penn Ave., Pittsburgh. Firm will specialize in the design and construction of rolling mill equipment, will handle special conveyor and materials handling apparatus and will act as a manufacturers' representative.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has reduced prices on its multiple v-belt drive from 7 to 19 per cent.

New Welding Group Formed

Resistance Welding Institute has been formed as an educational organization for the dissemination of information on technical advances in resistance welding. Lee H. Judge is director of the institute which has its headquarters at 519 C.T.S. Bldg., Cleveland.

LEE H. JUDGE

Sponsored by a number of companies interested in resistance welding, the institute has been created to make available to industry up-to-the-minute facts on spot, seam, flash and projection welding.

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The Business Trend

TEMPO of industrial activity continued brisk in the week ended Apr. 16 as STEEL's industrial production index remained at 174 per cent of the 1936-1939 average, equaling the high mark for the year attained in revised totals for the preceding week. A number of metalworking concerns have revised their prices downward in the past two weeks. However, the reason advanced by some of them is that they are passing on savings made possible by greater efficiency and availability of non-premium raw materials.

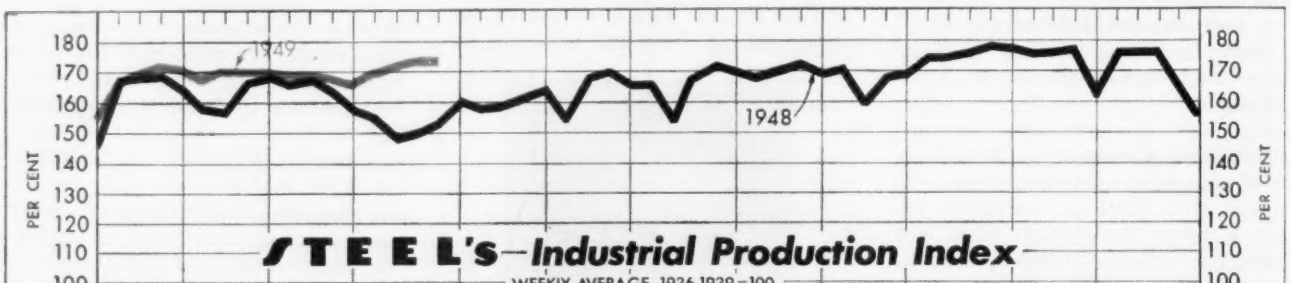
AUTOMOBILES—Currently operating at the highest rate in the postwar period, the automotive industry is the pacesetter in industrial activity. During the week ended Apr. 16, outturn was 133,335 passenger cars and trucks, breaking the postwar record of 131,970 set in the preceding week. Greater availability of cold-rolled sheet and strip is a big factor in increased output. Not all shortages have been conquered, however, and delays still upset production schedules but to a lesser extent than a few months ago.

PRICES—All major groups of commodities composing the Bureau of Labor Statistics' wholesale price index declined during the week ended Apr. 12, causing the index to continue its descent to 157.6 per cent of the 1926 average from 158 in the preceding week.

STEEL—Production of steel for ingots and castings was at 99 per cent of capacity in the week ended Apr. 16, up half a point from the preceding week. Demand for most steel products continues high although consumers are no longer willing to pay fancy premiums in order to get steel. A number of producers have reduced prices on items that have been out of line with the majority but not all premium items have disappeared.

COAL—Recent weeks have seen the closing of the gap between total bituminous coal production to date and the corresponding period last year. The reason is that at the same time last year the nation was in the grip of a coal strike stemming out of the welfare fund dispute. Production in the week ended Apr. 9 was 11,250,000 net tons compared with 2,475,000 tons in the corresponding week of 1948.

INCOMES—Personal income declined to an annual rate of $217 billion in February from $219.5 billion in January, according to the Commerce Department. About two-thirds of this decline was in agricultural income with the reduction in nonagricultural incomes only about half as large as that in the preceding month. Drop in wages and salaries in February was of about the same amount as in January and stemmed from employment declines in manufacturing, construction and trade. Although payrolls in the durable goods manufacturing industries continued to fall in February, the decline in nondurable payrolls was halted. Payrolls in both of these groups were slightly higher than a year ago. Latest report from Federal Security Agency's Bureau of Economic Statistics is that number of persons filing continued unemployment claims declined 32,000 in the week ended Apr. 9.



Index (chart above): Week ended Apr. 16 (preliminary) 174 Previous Week 174 Month Ago 169 Year Ago 150

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	99.0	98.5	101.5	73.0
Electric Power Distributed (million kilowatt hours)	5,343	5,360	5,496	5,087
Bituminous Coal Production (daily av.—1000 tons)	1,875	1,600	1,725	413
Petroleum Production (daily av.—1000 bbl)	4,912	4,916	5,145	5,391
Construction Volume (ENR—Unit $1,000,000)	$158.2	$178.2	$127.3	$144.6
Automobile and Truck Output (Ward's—number units)	133,335	131,970	120,741	104,761

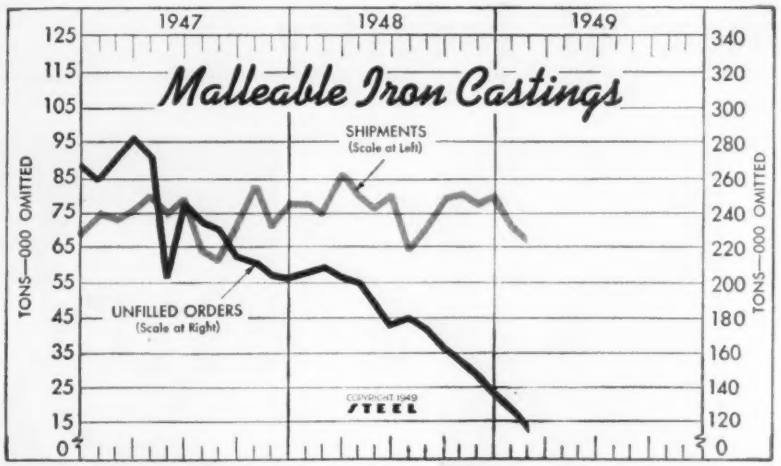
* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.

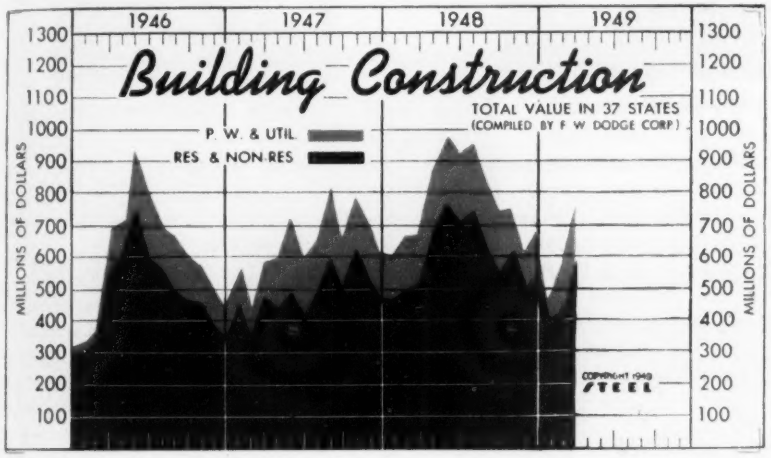
TRADE				
Freight Carloadings (unit—1000 cars)	762†	758	608	786
Business Failures (Dun & Bradstreet, number)	184	230	210	101
Money in Circulation (in millions of dollars)‡	$27,507	$27,514	$27,500	$27,774
Department Store Sales (changes from like wk. a yr. ago)‡	+7%	+7%	−8%	+13%

† Preliminary. ‡ Federal Reserve Board.

Malleable Iron Castings

	Shipments (000 omitted) 1949	1948	Unfilled orders for castings for sale (000 omitted) 1949	1948
Jan.	71.9	77.7	126	206
Feb.	66.7	75.2	118	209
Mar.	...	86.8	...	203
Apr.	...	80.6	...	200
May	...	76.1	...	192
June	...	81.7	...	179
July	...	64.9	...	180
Aug.	...	73.3	...	177
Sept.	...	77.8	...	164
Oct.	...	81.8	...	158
Nov.	...	77.2	...	146
Dec.	...	79.9	...	137
Total	...	933.1	...	...





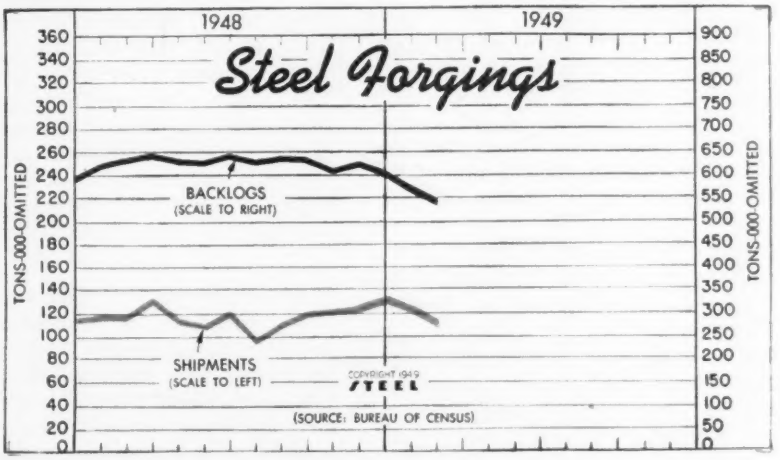
Construction Valuation in 37 States
(Unit—$1,000,000)

	Total 1949	Public Works Utilities 1949	1948	Residential and Non-residential 1949	1948
Jan.	483.0	102.0	136.6	381.0	478.6
Feb.	568.5	153.5	177.3	415.0	504.6
Mar.	747.6	168.4	164.3	579.2	525.5
Apr.	....	....	184.7	....	689.2
May	....	....	205.0	....	765.8
June	....	....	215.7	....	719.5
July	....	....	217.9	....	744.8
Aug.	....	....	207.8	....	646.3
Sept.	....	....	202.7	....	559.5
Oct.	....	....	165.5	....	613.1
Nov.	....	....	106.9	....	504.3
Dec.	....	....	170.9	....	523.1
Total	....	....	2,155.3	....	7,274.4

Steel Forgings
(Tons—000 omitted)

	Shipments* 1949	1948	Unfilled Orders* 1949	1948
January	125	118	571	618
February	111	117	540	631
March	...	131	...	641
April	...	114	...	628
May	...	109	...	624
June	...	120	...	641
July	...	97	...	627
August	...	111	...	634
September	...	121	...	631
October	...	123	...	605
November	...	124	...	621
December	...	132	...	601

* Forgings for sale.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,979	$13,583	$13,872	$12,663
Federal Gross Debt (billions)	$251.5	$251.5	$252.0	$252.3
Bond Volume, NYSE (millions)	$12.3	$16.9	$14.5	$23.4
Stocks Sales, NYSE (thousands)	3,712	4,834	3,894	7,378
Loans and Investments (billions)†	$61.0	$61.2	$62.0	$62.9
United States Gov't. Obligations Held (millions)†	$32,397	$31,750	$33,206	$35,215

† Member banks, Federal Reserve System.

PRICES

STEEL's Composite Finished Steel Price Average	$94.91	$94.91	$97.32	$81.14
STEEL's Nonferrous Metal Composite‡	202.3	209.4	223.5	196.6
All Commodities†	157.6	158.0	158.4	162.7
Metals and Metal Products†	173.5	174.0	175.1	157.1

† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100.

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Men of Industry

DR. WILLIAM M. LOFTON JR.

EDWARD L. McILHENNY

ALEX CRUICKSHANK

Dr. William M. Lofton Jr. has been appointed director of the Division of Research & Development, Sloss-Sheffield Steel & Iron Co., Birmingham. He recently resigned as assistant director of the University of Louisville Institute of Industrial Research. From 1938 until 1946 he served as chief chemist on research for Pennsylvania Coal Products Co., Petrolia, Pa.

—o—

Ohio Ferro-Alloys Corp., Canton, O., announces appointment of **Eric G. Skarin** as service metallurgist for the company. Formerly metallurgist at Midvale Co., Philadelphia, Mr. Skarin had previously served for 14 years in the alloy open-hearth department of Bethlehem Steel Co., Bethlehem, Pa.

—o—

Changes in the advertising department of Dravo Corp., Pittsburgh, include the appointments of **Thomas M. Fallon** as manager of advertising for the Machinery Division; **George J. Newhams,** manager of advertising for the Engineering Works Division; and **Edward P. Pearsall,** manager of corporation publications.

—o—

Tinkham Veale II has been appointed assistant to the president, Ohio Crankshaft Co., Cleveland. He has been with the company since 1942, serving for the past three years as manufacturing and administrative head of the Tocco Division.

—o—

Wallace W. Smith, formerly general superintendent of the Pittsburgh plant, Pittsburgh Screw & Bolt Corp., has been appointed manager of operations of both the Pittsburgh and Graham plants of the company. **Russell T. Pollock,** formerly assistant superintendent of the Pittsburgh plant, has been appointed general superintendent of that plant. **R. L. Irvin,** works manager, Graham Bolt & Nut Division, will continue in his present capacity, and **F. B. Gordon,** formerly vice president in charge of operations, and **G. H. Lee** will continue as vice presidents of the corporation in advisory positions.

—o—

Edward L. McIlhenny has been appointed manager of the Southern Division, Ferro Enamel Corp., Cleveland. He will maintain headquarters at the company's new plant at Nashville, Tenn. Mr. McIlhenny has a background of 25 years' experience in the metal preparation and finishing fields, and has authored numerous technical papers on metal preparation and finishing techniques.

—o—

S. Floyd Stewart, executive vice president, Leece-Neville Co., Cleveland, was elected president of the company, succeeding the late **B. M. Leece. Charles S. Cook,** for eight years assistant to the president, was elected a vice president. He had been named treasurer and elected to the board of directors in 1948. **J. S. Allt** was appointed as auditor of the company.

—o—

Donald Alexander will resign, May 11, 1949, as vice president of Budd Co., Philadelphia. Mr. Alexander, who has been connected with the company since 1919, plans to retire from active business. He will, however, continue as a member of the board of directors.

—o—

Black & Decker Mfg. Co., Towson, Md., announces that **R. A. Lomas,** service engineer at its Seattle branch, has been transferred to the Los Angeles branch to supervise all service activities in southern California. **G. S. Ellis** has been promoted to service engineer at Seattle.

—o—

Alex Cruickshank has been appointed plant engineer in charge of maintenance for McConway & Torley Corp., Pittsburgh. He has been associated with the New England Metallurgical Corp. and with Jones & Laughlin Steel Corp. for 16 years prior to joining McConway & Torley Corp., manufacturer of carbon and alloy steel castings and railroad specialties.

—o—

Samuel B. Lincoln has been elected president of Lockwood Greene Engineers Inc., New York, succeeding **Chester S. Allen,** who becomes chairman of the board.

—o—

Howard W. Stephens, formerly of Wheeling Steel Corp., Wheeling, W. Va., has joined the eastern sales organization of Cold Metal Products Co., Youngstown, producer of cold-rolled strip steel. Mr. Stephens will make his headquarters in Philadelphia.

—o—

Robert C. Seaton has been named manager of the Richmond, Va., sales branch of National Radiator Co., Johnstown, Pa. He succeeds **William E. Austin,** retired.

—o—

Elizabeth Iron Works Inc., Union, N. J., announces the promotion of **Ellsworth B. Beyer** to sales and estimating. He has held the position of purchasing agent, and is succeeded by **Edward J. Manz.**

—o—

Richard L. Donoghue, who has served

FROM

HOT METAL

TO

COLD STEEL

Last winter in the north woods, this International Diesel Crawler hauled heavy loads over rough, frozen terrain with the temperature at the bottom of the thermometer. Tough on steel? You bet it is.

But through *quality control*—in blast furnaces, open hearths, all through the mill—Wisconsin steelmen produced steels with stamina for this International—steels that can take a beating. Quality is the watchword at Wisconsin Steel Works.

WISCONSIN STEEL COMPANY, Affiliate of INTERNATIONAL HARVESTER COMPANY

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INTERNATIONAL HARVESTER

WISCONSIN STEEL

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since 1947 as purchasing agent of steel products, Easy Washing Machine Corp., Syracuse, N. Y., has been named director of purchases. He succeeds **F. O. Dutton,** resigned to accept a position in Toledo, O.

—o—

W. C. McConnell has been appointed special representative to the steel industry of the Chas. Taylor Sons Co., manufacturer of refractories, Cincinnati and Taylor, Ky. Mr. McConnell has served with several companies, his previous position being assistant works manager at Mitchell Steel Co. from 1946 to 1948. His headquarters will be at Taylor's Cincinnati office.

—o—

Robert C. Vroom has been appointed executive adviser and consultant of Peabody Engineering Corp., New York. He will concentrate on all phases of the company's activities, with particular attention to planning, procedure and overall policy, with headquarters at New York.

—o—

James M. Stapleton has been appointed division superintendent of blast furnaces for the South Chicago plant of Carnegie-Illinois Steel Corp., subsidiary, United States Steel Corp. He succeeds **George E. Steudel,** retired, and is succeeded as assistant blast furnaces division superintendent by **W. D. Millar.**

—o—

Edwin S. Carman, founder and president for 20 years of Edwin S. Carman Inc., Cleveland, foundry engineer and consultant, has been elected chairman of the board of directors, and **Thornton S. Carman,** general manager, has been elected president of the company.

—o—

Frank B. Brown has been appointed managing director of the Wire Reinforcement Institute, with offices in Washington. He succeeds **T. J. Kauer,** who recently accepted appointment as director of the department of highways for Ohio. Mr. Brown has been in charge of structural concrete design for Arthur G. McKee Co., Cleveland, for the past 10 years.

—o—

Harry Ferguson Inc., Detroit, tractor manufacturer, has named **Curry W. Stoup** advertising and sales promotion manager, a position he formerly held with the company from 1941 to 1944, at which time he resigned to join Foote, Cone & Belding, advertising agency.

—o—

R. E. James has been appointed western regional manager of appliance sales, and **F. J. Blume,** eastern regional manager of appliance sales, Rheem Mfg. Co., San Francisco.

—o—

Frank J. Grunder has been appointed sales manager, R. C. Neal Co. Inc., Buffalo. He will co-ordinate sales activities in the company's offices in Rochester, Syracuse and Elmira, N. Y.

—o—

Harlow Scott has been named purchasing agent of Pratt & Letchworth, Buffalo. He was formerly assistant purchasing agent.

—o—

Stanley Works, New Britain, Conn., announces that **W. R. Morse** has been elected vice president in charge of the Hardware Division, succeeding **Patrick F. King,** and that **Harold E. Pape** succeeds **Maurice H. Pease** as vice president of the Steel Division of the company, and will also continue in his present capacity as director of purchases. Messrs. King and Pease, in withdrawing from active managerial duties, accept advisory positions. **Raymond C. Ball,** first vice president, Phoenix State Bank & Trust Co., Hartford, Conn., has been elected a director of Stanley Works, succeeding **Joseph E. Stone,** formerly vice president of sales, who, owing to ill health, had requested that his name not be submitted for re-election as a director.

—o—

Robert C. Wilson has been appointed manager of sales at the Norwood, O., works of Trumbull Electric Mfg. Co., Plainville, Conn.

—o—

C. A. Tate has joined the Pittsburgh office of Harbison-Walker Refractories Co. as assistant divisional superintendent. He was formerly district superintendent of the company's Olive Hill, Ky., and Portsmouth, O., works.

—o—

Chester D. Jones Jr. has been appointed purchasing agent of Diamond Alkali Co., Cleveland. In assuming this new post, Mr. Jones returns to the company's general headquarters at Cleveland from Houston, where he has served "on leave" since 1946 as plant purchasing agent during the construction and initial production period of the company's recently completed electrolytic chlorine-caustic soda plant. **W. C. Logan,** who joined the purchasing department in 1925, has been named assistant purchasing agent; **W. C. Mahan** also advances to assistant purchasing agent; and **P. P. Eppinger,** who joined the department at the Houston plant two years ago, succeeds Mr. Jones as plant purchasing agent there.

—o—

W. L. Baker has been appointed district sales representative in central Ohio for Nottingham Steel Co., Cleveland. He formerly was with Bethlehem Steel Co.

—o—

Alfred S. Osbourne and **Louis A. Mertz** have been elected directors of Dravo-Doyle Co., a subsidiary of

W. R. MORSE

HAROLD E. PAPE

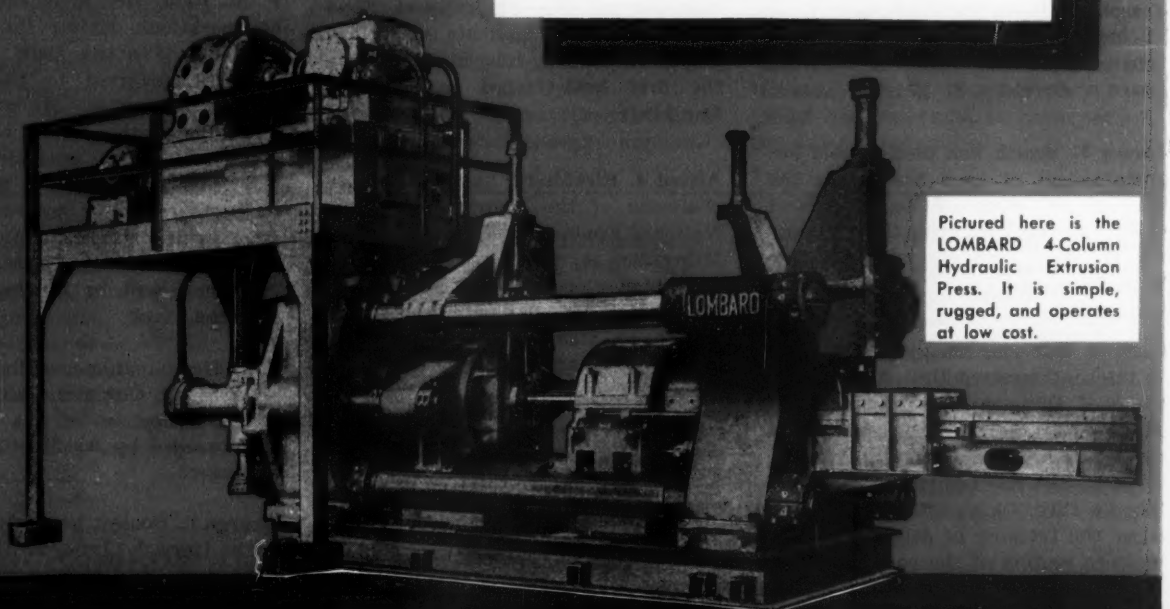
CHESTER D. JONES JR.

LOMBARD

SIMPLICITY OF DESIGN..... ECONOMICAL OPERATION...

MECHANICAL PUNCH AND FORMING PRESSES · EXTRUSION PRESSES · COMPLETE HYDRAULIC SYSTEMS · INTENSIFIER SYSTEMS · COMPLETE PLANT DESIGN · COMPLETE CONSTRUCTION AND INSTALLATION OF INDUSTRIAL BUILDINGS AND MACHINERY

If it takes money to make money, then LOMBARD service and products are the logical investments for manufacturers who use hydraulic and mechanical presses. The LOMBARD CORPORATION has a great deal to offer to such manufacturers. Consider our 4-column hydraulic extrusion press, for instance. This machine is a development of a leading industrial engineering organization. It is furnished as a self-contained, compact unit. It is easy to install and set up, and simple to rearrange to production lines as requirements demand. LOMBARD presses are designed and built to meet specific applications. Our engineers supervise their installation and remain on hand until the machines are in full operation. An industrial engineering organization *should* feel a deep responsibility for its products and services, and it is the weight of this responsibility that colors the relationship between the LOMBARD CORPORATION and its clients. So long as we feel that ANY of our products is "our baby", Lombard customers may be assured of continued service and satisfaction.



Pictured here is the LOMBARD 4-Column Hydraulic Extrusion Press. It is simple, rugged, and operates at low cost.

LOMBARD CORPORATION

Designers and Builders of Special Machinery

EMPIRE BUILDING · YOUNGSTOWN 3, OHIO

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HUGO W. JONES

THOMAS A. GOODRIDGE

F. M. RICH

Dravo Corp., Pittsburgh, which engages in the sale and rental of new and used construction equipment. Mr. Osbourne also is a director and member of the executive committee of Dravo Corp. Mr. Mertz is director, vice president and treasurer.

—o—

Hugo W. Jones has joined Adamas Carbide Corp., Harrison, N. J., as assistant sales manager. For the past 10 years he has been associated with the Tungsten Electric Corp., and was previously with Westinghouse Electric Corp. for 14 years.

—o—

L. A. Wacker, Sterling Tool & Mfg. Co., Milwaukee, has been elected president of the Tool, Die & Machine Shop Association of Milwaukee. **A. R. Gieringer** was elected vice president, **Joseph A. Bock,** secretary, and **E. J. Michalski,** treasurer. **Jerome Stanek,** retiring president, was named to the board of directors.

—o—

James E. Smith has been named superintendent of open hearths at the Warren, O., plant of Republic Steel Corp. He has been with the company for 25 years and succeeds the late **R. B. Hastings.**

—o—

Cecil B. Roberts, sales representative in the southwestern United States for the B-K Division, Pennsylvania Salt Mfg. Co., Philadelphia, has been named a product supervisor of the division. He has headquarters at Oklahoma City, Okla., and will now assume the training of salesmen in the western section of the country.

—o—

G. W. Thompson has been named field manager for the Dallas sales district, and **Joseph P. Loftus** has been named to a similar post in the district comprising New York state for B. F. Goodrich Co., Akron. **T. C. Culver** has been appointed representative for Hycar and rubber chemicals for Goodrich Chemical Co., subsidiary company. **Charles L. Campbell,** manager of the Philadelphia district of the Replacement Tire Sales Division, B. F. Goodrich Co., since 1936, has been appointed sales development manager of the eastern division. He is succeeded in the Philadelphia post by **L. O. Veith,** who has been manager of the company's Harrisburg, Pa., retail store.

—o—

Thomas A. Goodridge has been appointed assistant to the president of Maremont Automotive Products Inc., Chicago and New York, serving as special adviser on agricultural problems in both the steel and farm implement industries. Formerly with Crucible Steel Co., where he was manager of the Agricultural Steel Division for 22 years, Mr. Goodridge played a leading role in developing the first heat-treated carbon steel disc blade.

—o—

Alfred J. Kieckhefer has been elected chairman of the board of directors, National Enameling & Stamping Co., Milwaukee, a new post, and **Willard H. Sahloff** succeeds Mr. Kieckhefer as president. Mr. Sahloff recently resigned as vice president and merchandising manager of Montgomery, Ward & Co., Chicago.

—o—

C. H. Butts will resign May 1 as operating vice president and director of Sharon Steel Corp., Sharon, Pa. **J. E. N. Hume** has been elected to succeed Mr. Butts as a director of the company. Mr. Hume was a former executive vice president of General Electric Co.

—o—

Norman E. Olds, advertising manager, Perfection Stove Co., Cleveland, will retire May 15, after 25 years in that position. He will finish 30 years' association with the company, having previously served for five years as sales manager of its Canadian branch.

—o—

Robert C. Hoffman has been transferred from industrial engineer to Chicago distributor sales representative for the Radio Division, Sylvania Electric Products Inc., New York. He will have headquarters in Chicago. **Richard B. Leng** has been appointed controller of the Electronics Division of the company.

—o—

Dr. Raymond E. Masters has been appointed plant medical director for the recently formed Atomic Power Division of Westinghouse Electric Corp., Pittsburgh.

—o—

F. M. Rich, vice president in charge of operations, Kaiser Co. Inc., now located at Fontana, Calif., will shortly be transferred to the Oakland, Calif., home office. He will continue to be responsible for all manufacturing and mining operations of the company. This move is made in the interests of better co-ordinating the primary departments of the company. **George B. McMeans,** general superintendent, will be in charge of the Fontana plant.

—o—

John Hood, manager of the apparatus department, Oakland, Calif., works of General Electric Co. has retired. He is succeeded by **Ab Martin,** assistant manager.

—o—

George L. Dealey, formerly associated with Herrick Iron Works in San Francisco, has been appointed vice president in charge of sales of Barrett & Hilp.

—o—

James P. Kinney, vice president, Gordon, Kinney & Staninger Inc., Detroit, has been named general chairman of the fourth annual Industrial Packaging & Materials Handling Ex-

K. B. HOLLIDGE
Appointed executive vice president and secretary, Arthur Colton Co., Detroit. Noted in STEEL, Apr. 11 issue, p. 77

JAY W. OWINGS
Appointed assistant general manager of sales, Youngstown Sheet & Tube Co., Youngstown. Noted in STEEL, Apr. 11 issue, p. 74

C. S. BYGATE
Appointed assistant vice president, Meter & Valve Divisions, Rockwell Mfg. Co., Pittsburgh. Noted in STEEL, Apr. 11 issue, p. 74

position, to be held in Detroit in October.

—o—

Ralph Perkins has been elected to the board of directors of the M. A. Hanna Co., Cleveland. Mr. Perkins is chairman of the board of directors of Hill Acme Co., Cleveland.

—o—

W. Murray Sanders has been appointed to the New York staff of McKinsey & Co., New York, as a marketing consultant.

—o—

W. A. Terwilliger has been appointed manager of the Pigment Division in the Atlantic branch of National Lead Co., New York. He succeeds **William F. Hurley,** retired. **J. A. Zang** becomes assistant manager.

—o—

John P. Feagley has been appointed district sales manager in charge of the New York office of Youngstown Sheet & Tube Co., Youngstown, succeeding **Lew E. Wallace,** who recently was transferred to Youngstown as general manager of sales. Mr. Feagley has spent 17 years with the company, all of them in the New York office.

—o—

William H. Graves, executive engineer, Packard Motor Car Co., Detroit, has been elected vice president and director of engineering. **Col. J. G. Vincent** continues as vice president of engineering.

—o—

E. A. Bertram has been appointed manager of sales for Brown Fintube Co., Elyria, O. He will be in charge of sales of the company's products in the petroleum and chemical industries through its representatives in the principal cities of the United States.

—o—

A. F. Holden Co., New Haven, Conn., announces the following appointments to executive positions: **J. B. Carey,** formerly sales manager, named vice president in charge of research and chemical manufacture; **C. R. Brown,** appointed vice president—sales; **C. R. Hecker,** appointed sales manager and export manager for all Holden products.

—o—

W. C. Griffin, formerly raw materials buyer at Eureka Williams Corp., Bloomington, Ill., is now associated with L. S. Watlington Mfg. Co., Bloomington, as business manager and purchasing agent.

—o—

D. L. Coleman, field engineer in the Detroit district for Ampco Metal Inc., Milwaukee, has been named district manager of the company's recently established Eastern-Texas Division. He will have headquarters at Houston. **Irving S. Levinson** has joined the company as manager of the process industries.

OBITUARIES . . .

Frank E. Vigor, 62, vice president in charge of operations, Armco Steel Corp., Middletown, O., died Apr. 12 at Cleveland. He joined Armco in 1910. A member of the iron and steel section of WPB during the war, he became assistant director of its Steel Division.

—o—

John Wilson, 69, retired president, National Steel Construction Co., Seattle, died Apr. 12. He was engaged in shipbuilding prior to and during the first world war.

—o—

Clarence F. Wackman, 58, works manager and assistant secretary, Southern Metal Products Co., Houston, died Apr. 11. He had, previous to his association with this company in 1943, been identified with Wackman Welded Ware Co. as manager of its Houston plant.

—o—

Curtis S. Garner, 73, who retired in 1945 as first vice president, American Bridge Co., Pittsburgh, subsidiary, United States Steel Corp., died in Ben Avon, Pa., Apr. 11.

—o—

Elmer A. Steckel Sr., 68, founder and retired president, American Iron Works Corp., Denver, died recently.

—o—

E. Warner Bacon, 57, president, Erie Tool Works, Erie, Pa., died Apr. 8.

—o—

George Mendel, 77, associated with Weirton Steel Co., Weirton, W. Va., for 43 years, retiring nine years ago, died Apr. 6. He had served as purchasing agent and manager of the company's order department.

—o—

Frank D. Martin, founder and president, Newark-Engineering Co., Hillside, N. J., died Apr. 15.

—o—

Karl L. Schade, 54, vice president and general manager, Dostal & Lowey Co. Inc., Menomonee Falls, Wis., died recently.

—o—

Edward B. Butterfield, superintendent, Rochester Casting Corp., Rochester, N. Y., died recently.

—o—

Charles E. Martindale, 80, for 32 years superintendent at the Main Machine Works Ltd., Los Angeles, died Apr. 13.

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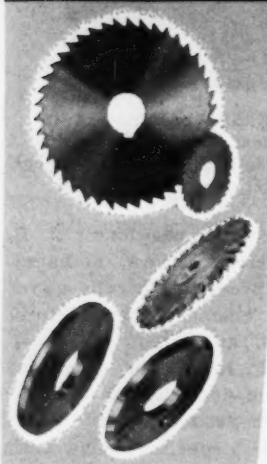

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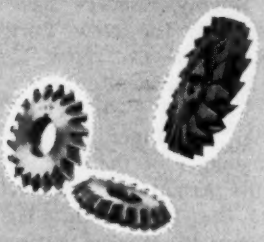

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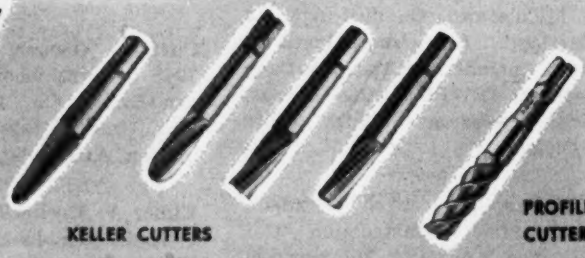

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Engineering News
. . . AT A GLANCE

PRODUCES PURE TITANIUM— In Washington, Department of the Interior reports that pure titanium is being produced by a semicommercial process developed by the Bureau of Mines. Because the metal is active chemically, and at high temperatures reacts readily with the atmosphere, it is extremely difficult to produce in pure form by melting and casting as with other metals. In the process developed by the bureau, titanium powder is heated to elevated temperatures while sealed in ductile, gas-tight containers. Product derived then is hot-rolled, providing a solid, nonporous metal for working into machinery parts, construction members, etc. Bureau metallurgists also are currently conducting tests to ascertain possibilities of titanium alloys. Titanium-nickel is presently being scrutinized.

ENGINE BALANCER— A production line unit, employed to balance dynamically a complete Buick 8-cylinder engine, was shown for the first time at General Motors' Transportation Unlimited show at Detroit's convention hall, Apr. 10-17. The machine, which detects "stacking" in a single direction or any other off-center condition that may develop during assembly of various individually balanced parts, holds the engine in a cradle suspended with metal reeds. A shaft from a 20-hp motor on the balancing unit drives the engine at speeds up to 1800 rpm or about 36 mph. Any vibration is picked up and amplified on a pair of sensitive light ray indicators.

ADDS LIFE TO FORMING TOOLS— In Detroit, Chrome Electro-Forming Co. reports that many firms are obtaining from 300 to 1000 per cent additional life from metal cutting and forming tools by using its newly developed process of chrome-electro plating. According to the company, the process has been used on many occasions to add over 0.002-inch to the pitch diameter of a threaded plug gage without developing taper—even though it is not commercially feasible. Plated tools also withstand terrific shock without checking being used on chipping chisels and riveting bucks in many cases increasing the wear life of these tools some 600 per cent.

WIDENS UTILITY OF DIAMONDS— Newly formulated synthetic vehicle used in the preparation of diamond compounds is reported to permit machine lapping operations with diamond abrasives for the first time. Developed by Elgin National Watch Co., Aurora, Ill., it provides special characteristics that make the compound more economical as a finishing method in industrial applications. Besides resisting caking and being universally soluble in commercial solvents, the vehicle has an increased range of temperature stability—from 150 to minus 50° F. Abrasives including the vehicle can be used for finishing carbide and hardened steel parts, drawing dies, bearing surfaces etc., without leaving a dulling film on the finished surfaces.

MAGNETIC PLOTTER— Conclusive and accurate magnetic torque curve of any steel can be plotted in a matter of 6 minutes from a sample about the size of a quarter with an instrument developed recently by Donald S. Miller in the Research Laboratory of U. S. Steel Corp of Delaware. The instrument, it is reported, is being used to test improved high-grade silicon steels for electrical transformer cores in which superior magnetic properties are desired in the rolling direction, and in controlling production of tin plate with uniform drawing properties for making such products as bottle caps. Development is said to be a valuable new tool for studying drawing qualities of steel. It also makes magnetic torque testing automatic and practical in mills and labs.

CORROSION PROOFING—Although many attempts have been made to provide corrosion resistance to iron and steel through various remedies, none seemed to approach the end-objective so well as a product under test for the past 2 years. The coating, a zinc-content liquid formulation, which is applied to surfaces like paint, is estimated to provide 26 years of protection with one application. (p. 80)

OFF-GAGE MINIMIZER — Amount of off-gage sheets coming off the last finishing stand of a continuous hot-strip mill in the Cleveland plant of Republic Steel Corp. is currently kept to a minimum by an electronic instrument that continuously measures the thickness of the metal. The unit, which is capable of measuring the traveling steel at speeds up to 5000 fpm, provides an immediate thickness check so that the rolls may be adjusted very quickly to prevent processing much off-gage material. (p. 83)

MATTER OF PLANNING — Safety practice in a plant involved with arc welding operations should begin before the installation of welding equipment rather than after it is in production. A manufacturer, it is pointed out, can do a great deal to contribute to safe operation of the equipment through careful attention to details of construction, such as terminal markings, enclosures, internal wiring etc., and to careful installation. Such measures not only provide operator protection, but also are instrumental in promoting safe maintenance procedures not to mention uninterrupted production. (p. 86)

OPERATOR'S DOMAIN — Only two devices—a spectroscope that reflects chemical change in the bath and the photoelectric cell—have thus far been found useful in controlling the bessemer blow. Otherwise, control of the blow is dependent on the skill of the individual operator. Numerous variables associated with the process itself, in addition to known differences in human beings' judgment based on visual observation, resulted in a search for some active assistance to the blower in form of scientific instruments. Some of these proved too complicated and involved to be used in production, and too slow to be adapted to a process as rapid as the bessemer. (p. 102)

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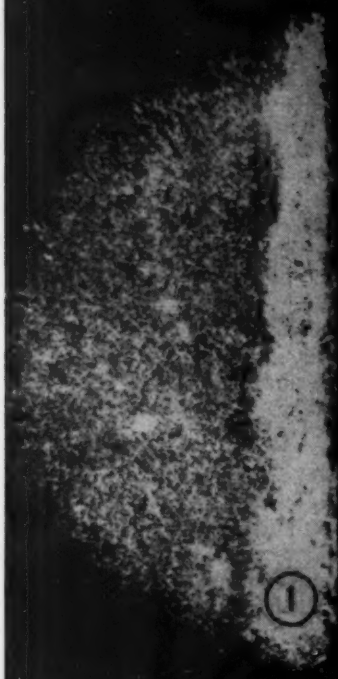
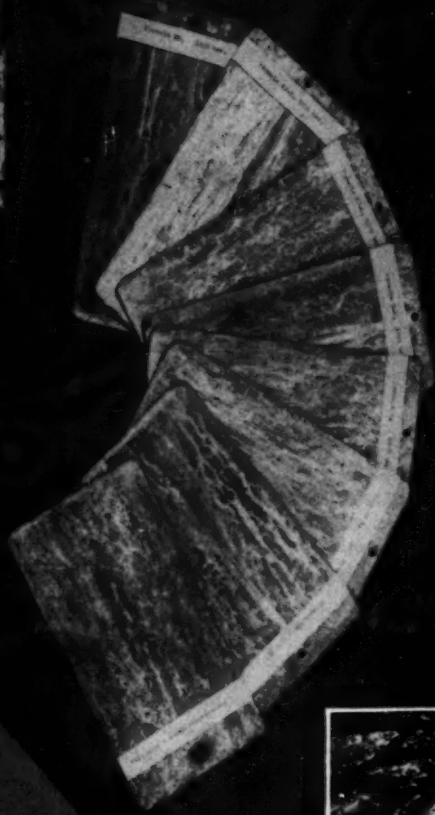
Corrosion-Proofin





Simplified

. . . by liquid zinc-content coating applied like paint

By JOHN R. FISHER Jr.
Industrial Metal Protectives Inc.
Newport News, Va.

PERHAPS no other problem in the application of ferrous metals is as universal as that of corrosion. Urgency of the problem can be readily appreciated when it is understood that the annual world cost of this destructive force has been conservatively estimated at 2 billion dollars.

Many approaches have been made in the attempt to provide corrosion resistance to iron and steel to extend useful life of structural and mechanical parts. Supplying steel with special alloy constituents, the provision of metallic and mechanical coatings, and surface impregnation are the broad headings under which the many proposed remedies fall.

All of these familiar remedies have a common failing, however, which is that none is universally applicable to the broad range of iron and steel usage to defeat satisfactorily the common forces of corrosion. Stainless steel, for example, has excellent resistance to oxidizing environments, but considerations of economy and fabrication make its use in larger structures impossible. Electrodeposited nickel, tin, chromium and the noble metals all exhibit good corrosion resistance, but again, expense and size of the element handled are limiting factors.

Phosphate and oxide chemical treatments can be economically applied to smaller objects, but these treatments offer only limited resistance. Silicon impregnation, chromizing and similar treatments exhibit better life characteristics, but here expense once more becomes a prime factor.

Most widely applicable of the well-known surface treatments are paints of several types, and galvanizing. The paints are economical, and can be readily applied to equipment or structures of all sizes. Because the surface wears away in use and as a result of exposure to the elements, however, painted surfaces must be retreated at fairly frequent intervals.

Galvanizing is somewhat more expensive, and special equipment is needed. Here the zinc deposited on the ferrous surface is electrolytically attacked in preference to the steel, and the protective surface sacrifices itself while the steel is untouched. The protection lasts as long as a sufficient quantity of zinc remains to bear the brunt of corrosion. Sacrifice is accelerated in industrial atmospheres.

None of the conventional protective treatments provides a ready answer to all of the problems of corrosion protection over a reasonably long period. Yet several of the various protective devices have some outstanding characteristic, which, if supplied in combination in a single treatment, would provide extremely efficient service.

It was with this thought in mind that the problem was approached by Industrial Metal Protectives Inc., in conjunction with Commonwealth Engineering Co. applied industrial research organization of Dayton, O.

Zinc-Content Coating—Extensive study and testing resulted in the formulation of a liquid zinc-content coating which can be applied in the same manner as paint, but with additional important qualities which are primarily associated with other types of protection. In limited commercial production 2 years ago, the new material, called Zincilate, has exceeded expectations in a wide variety of applications. Because field experience substantiates test conclusions which point to 20 years' protection from a single application of the coating, usage is expanding rapidly and it becomes worthwhile to examine the new development closely.

New material provides, first of all, an impervious coating of good adhesion without the need for preliminary priming or chemical surface treatment. Gray in appearance, and providing a matt finish, the coating is strongly resistant to surface abrasion, as indicated by Taber Abraser testing at 68,000 wearcyles using dual Calibrase type F-10 abrading wheels under 1000-gram loading.

Fig. 1—Portion of edge of hot rolled steel plate and portion of covering. Note deep penetration of material and protective surface layer of zinc on metal. 50X; depth of penetration averages from 0.0002 to 0.0004-inch

Fig. 2—Comparison of freshly-coated panels and coated panels which have been subjected to 1000 hours exposure in standard salt fog corrosion equipment

Fig. 3—Photomicrograph of the new coating after 1000 hours immersion in a 20 per cent salt spray solution (estimated equivalent to 20 years' normal exposure). Surface shows little change from initial texture

Fig. 4—Comparison between marine-service corrosion protection offered by conventional coatings, (left) and zinc-content coating (right) is shown by these buoys, after 1 year's immersion at Hampton Roads, Va. While buoy at right shows some rust staining from untreated cable and link pins, surface is intact and free from encrustation

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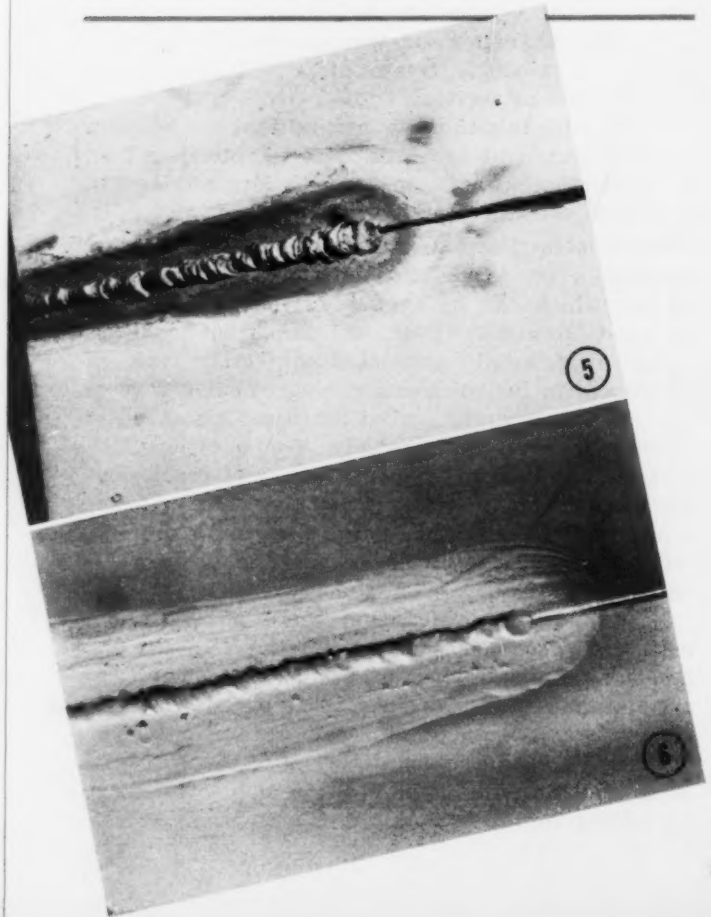
Zinc content imbedded in the coating provides the same electrolytic property exhibited by galvanized zinc or cadmium plating, that of self-sacrifice to protect the base metal. This characteristic is held in reserve, however, and comes into play only when coating is ruptured, or where minor discontinuities exist in the coating. Normally the other constituents protect the zinc itself; when necessary, galvanic action operates to "heal" small discontinuities. Even if the coating does not completely cover the basic metal, or if sections are scraped off during use, the material surrounding the exposed metal continues to protect the bare areas, providing those areas are not excessive. Further the material possesses penetrating power, and the vehicle goes below the surface being protected to promote binding and to enhance protection.

Long Life Expectancy—These three functions—imperviousness of the coating as a whole, reserve galvanic action in case of rupture, and penetrative protection—establish the long life expectancy of the treatment. Absolute dependency on covering continuity is eliminated and pinholes or ruptures do not offer a fatal foothold for damaging corrosion. As a result, treated parts show no film failure after 1000 hours of standard ASTM salt spray exposure, at 90° F and with 20 per cent solution. This performance exceeds by 500 per cent the specification of the armed services setting a 200-hour standard for protective coatings applied to war material. The nonporous coating also shows no failure in a 3600-hour weatherometer test. Such performance is judged equal to 20 years' exposure in ordinary service.

Fig. 5—Welded coated panel, showing relatively small area of coating destroyed

Fig. 6—Same panel as Fig. 5, showing ease of touch-up over welded area



In addition to its defiance of atmospheric corrosion and marine conditions, the material is also unaffected by mild acids and alkalies, hot water up to 150° F and air temperatures up to 600° F. Prolonged exposure to boiling water or to extreme ambient temperatures tends to soften the coating.

Application of the material is accomplished cold by spray gun, brush or immersion methods. Spray gun is most widely used, due to its versatility and inherent speed. Better control of coating coverage and uniform film thickness can also be obtained. Special immersion methods are used for the continuous coating of sheet, strip or wire at the mill.

Surface Preparation—Only surface preparation required is that necessary to provide a clean surface, free of scale. Abrasive blasting is a most effective way to prepare material for Zincilate, but other methods are in successful use, including electrolytic descaling and pickling, flame cleaning, with solvent degreasing or alkali cleaning where required.

Basic formulation which provides maximum service life involves baking the coated parts. After spraying, the coating is permitted to set for 5 to 15 minutes until the matte finish appears, and then heat is applied for 1 hour at 300° F, or for shorter periods at temperatures up to 700° F. where infrared lamps are used, parts are baked for approximately 15 minutes, with no enclosure necessary. Drying time before baking can be eliminated by preheating the metal to 150° F.

Where baking is not suitable, as in repairing existing structures or for application to surfaces which cannot be handled in oven equipment, an air-dry formulation is available which sets in 10 minutes, reaches final hardness in 24 hours. Salt spray life is 800 hours.

A third formulation has the same resistance but is extremely fast drying, for use where a final decorative coating is to be applied. Setting up in 3 to 5 minutes, a final coat may be superimposed almost immediately.

Undercoating—Ability of the coating to serve as an undercoating for supplemental finishes is important in such fields as consumer goods manufacture. Automotive body parts, business machines and household equipment are examples of goods where use of the material as a prime coating will contribute to an extended service life. The coating provides flexibility and adherence which will withstand the effects of light bending and forming operations, where coating before fabrication is advantageous. Sometimes appreciable savings can be realized in resultant elimination of rusting and straining of work in process.

Welding coated plate and structural parts destroys only the surface treatment immediately adjacent to the weld, and these areas can be quickly touched up to restore homogeneous protection.

Coverage of the material is approximately 400 square feet per gallon.

Ferrous sheets, shapes, bars, plates and wire are among the products being Zincilated on a production line basis, as are castings, stampings and forgings. Manufactured products so treated include automotive parts and assemblies, accounting machines, etc.

Electronic Thickness Gage... REDUCES AMOUNT OF OFF-GAGE STEEL

All damage to strip from scratching, marring or tearing is eliminated with this new type gage; and all expensive destructive inspection is avoided

FIRST successful application of continuous thickness measurement of steel leaving the last finishing stand of a continuous hot-strip mill was made recently at the Cleveland plant of Republic Steel Corp. The gaging equipment built by Sheffield Corp., Dayton, O., and known as a Measuray, is also capable of measuring thickness of any metal, rubber, plastic, film, foil and other materials in sheet or strip form instantly and continuously at any stage in their production. In fact, this type equipment can be applied to almost any production process where it is desired to measure and regulate thickness of material.

Any damage to the strip from scratching, marring or tearing is eliminated as no part of this gage contacts the material. In addition all expensive destructive inspection is eliminated. Whether the rate of movement of material being measured is 2 or 5000 fpm, the gage gives a continuous reading. Vertical motion of the moving material does not affect gaging accuracy. Any indicator fluctuation is eliminated on rippling stock by damping, thus affording an average reading and revealing the thickness trend.

The pick-up unit, for gaging hot-strip steel, is usually placed approximately 24 inches from the ma-

Fig.1—Diagram showing gaging principle used

Fig. 2—View of 100-kv thickness gage installation on the continuous hot strip mill of Republic Steel Corp. at Cleveland

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terial. It may be hinged and heavily guarded against damage from cobbling sheet or strip. It is reported that vibration of the mounting fixture or gage head has little effect on accuracy. In addition to an easily read indicator, it is possible to attach a continuous recorder or visible or audible signals; automatic control devices may also be actuated where economically practicable and feasible. The unit installed in the Cleveland plant is a 100 kilovolt hot-mill model which can gage steel up to 0.150-inch at a 24-inch gap. Heavier gages up to 0.250-inch can be measured by narrowing the gap between the pick-up over-arm and the x-ray tube housing.

All elements of the gage are combined in a self-contained unit having a pick-up cell in an over-arm. The unit is mounted on wheels so it may be positioned as desired on a track set at right angles to mill operation, to afford a check at the edges as well as in the center of the moving strip.

The wide gap between the over-arm and the self contained unit, permits the equipment to be in gaging position as strip starts through the mill. It gives an immediate check of thickness so that rolls may be adjusted very quickly, thus reducing the amount of off-gage steel produced.

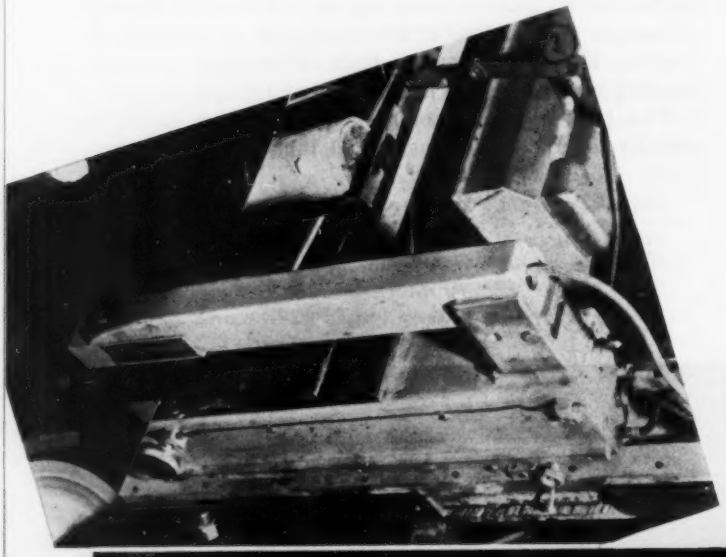
Throughout the rolling operation the unit may be traveled across the strip to indicate the amount of crown as well as the thickness at any point across the strip width. Roll adjustments are made according to the gage indication.

The gaging unit is essentially a comparator. It compares thickness of the material with a sample of the same material which has the required known dimension. The operating principle of the unit is based upon obtaining a measurement of thickness of a given material by the amount of absorbed x-rays.

For example, steel 0.050-inch thick with an allowable variation of plus or minus 0.001-inch is to be checked. Allowable variation in terms of percentage is plus or minus 2 per cent. A sample of the steel is selected having the known required nominal thickness of 0.050-inch. This is used as the master, and both the unit indicator and the gage indicator are set at 0. Checking operation is then started, and any variation in thickness between the stock and the master, registers on the indicator in terms of percentage, plus or minus as the case may be.

When x-rays from the tube pass through the master of known thickness, some are absorbed and the balance pass into a pick-up cell. Similarly when the beam of the x-ray passes through the material of unknown thickness, part of the x-rays are absorbed and the balance goes into another pick-up cell.

Outputs from both pick-up cells are then compared against each other and passed through an amplifier so that any difference is registered on the meter. If both master and unknown are the same thickness (absorb equal amounts of x-ray) then the comparison is the same and the meter would read zero. If the unknown absorbs less than the master, then the comparison is not the same and the difference is registered on the meter. This reading is in terms of percentage thickness variation in relation to the master sample. Incorporated in the unit is a "quick-change" master chamber for 24 different thicknesses of steel.



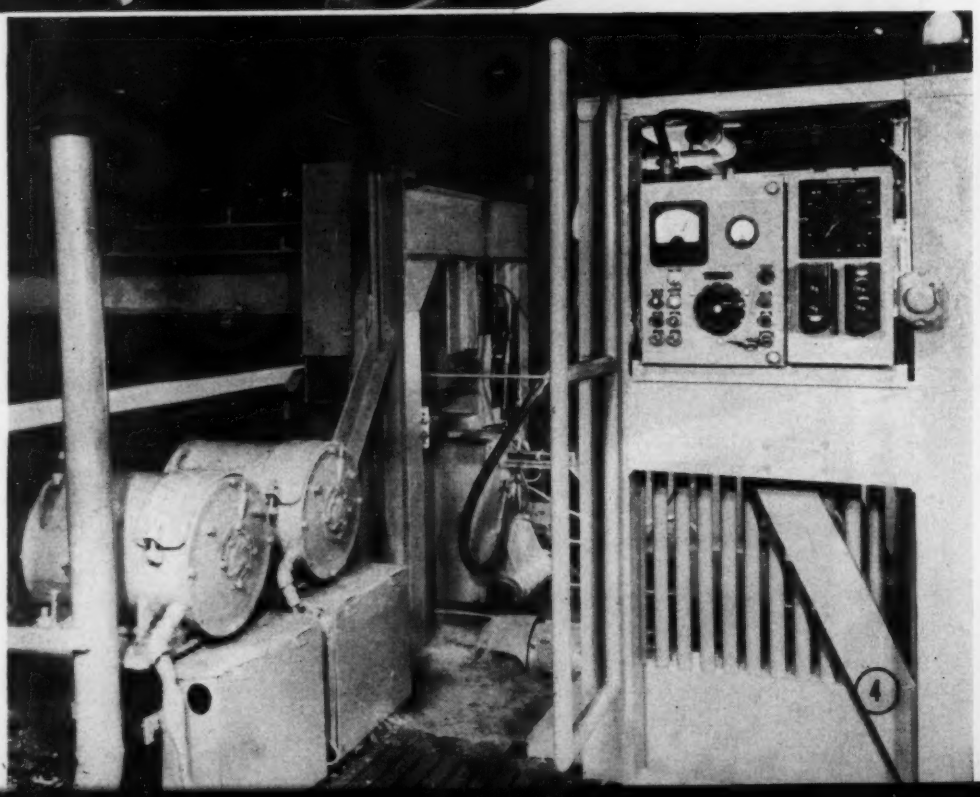


Fig. 3—Close-up of a 50-kv installation

Fig. 4 — Close-up of control cabinet on hot strip mill installation

SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

METAL ISN'T ALL: According to the official definition, a machine tool is "— a machine which removes metal progressively in the form of chips." My confidence in this definition was shaken somewhat when —on my way to the American Machine Tool Distributors' Association at Savannah—I stopped over for a day in Waynesboro, Pa.

There I found my friends at Landis Tool Co. machining glass, plastics, rubber and various other nonmetallic materials. Can it be possible that in their commendable zeal in discovering new fields to conquer, they are jeopardizing their membership in the select brotherhood of machine tool builders?

As a matter of fact they are doing exactly what was urged upon the industry by speakers representing both distributors and builders at the Savannah meeting—speakers who urged substitution of imaginative brains for "fat between the ears" on the part of those who design, build, tool up and sell machine tools. Perhaps blind adherence to the idea that a machine tool strictly is nothing but a "metalworking machine" may be cutting many companies out of some much-needed business today.

I recall that many years ago an enterprising salesman who had brains—rather than fat—between his ears, managed to get into a jewelry plant where imitation amber beads were being manufactured by rather primitive means. He talked them into using high speed single spindle automatics for forming, drilling and cutting off those beads from rods. Through this unorthodox suggestion he created a new market for automatics. Was he, or was he not, a machine tool salesman?

I recall another case where an automatic man got into a fountain pen factory. He found them machining hard rubber by slow hand methods. Through knowledge of diamond tooling (this was before the days of carbides) he developed methods for doing this work in automatics—and sold them a batch of automatics. Was he a machine tool saleman?

In this day and age when plastics and various other nonmetallic materials are becoming so important industrially, and when so many new techniques and tool materials suitable for operating on them are available, it would seem that a thorough canvass of "nonmetallic" fields by sales engineers of the machine tool industry is very much in order. The amount of business may not overwhelm any builder, but after all, every little bit helps.

Furthermore, I am sure that Tell Berna and other officials of the National Machine Tool Builders' Association will be lenient with you—even if they do catch you selling machine tools for removing material other than metal in the form of chips.

ELECTRIFICATION FORUM: This week—for the thirteenth time since 1936—I am attending the Machine Tool Electrification Forum. Lest someone should question my arithmetic, let me explain that the chain of meetings was broken once, in the spring of 1945, in compliance with an order from James W. Byrnes, Director of War Mobilization. That was the period—as you may recall—of "Hitler's Last Stand", an event which to no small degree was hastened by America's highly productive machine tools.

Development of this forum has been symbolic of what can be done in the public interest by private enterprise. It started as a small gathering of machine tool men and electrical men swapping information in the auditorium of the Westinghouse plant at East Pittsburgh. The idea caught on to such an extent that it soon outgrew those facilities. Thereupon it was transferred to William Penn Hotel in downtown Pittsburgh. With the removal of motor manufacturing to what had been a huge aircraft plant in Buffalo, the forum likewise moved to Buffalo.

Its current sessions are divided between Buffalo-Statler and Buffalo-Westinghouse. Westinghouse is the generous host but essentially it is the machine tool industry's own forum. Discussions no longer are limited solely to matters electrical. Mechanical engineering, hydraulic engineering, pneumatic techniques, "in-machine" materials handling, etc., all come in for attention.

The modern machine tool is indeed a highly complex creation in which all of the things just mentioned—and more—are apt to be tied in together. For example, spindles may be driven electrically; speed changes may be electronic; work slides may be fed by hydraulic means under control of limit switches and solenoid valves; chucking may be by compressed air and chip removal may be by vacuum system. If the cutting is a "wet operation", the oil or other coolant may be cleaned magnetically, refrigerated electrically and its "mist" trapped and condensed by high voltage plates or grids. To cap the climax, gaging may be electronic or by x-rays.

ON THE WASHINGTON FRONT: My return trip from Savannah brought me to Washington just in time to take in some unusually interesting sessions of National Conference of Business Paper Editors—including those from Canada. Among those who talked to us "at close range", were: President Harry S. Truman; Secretary of State Dean Acheson; ECA Administrator Paul Hoffman; Senator Margaret Chase Smith of Maine; and Joseph F. Parkinson, financial counselor of the Canadian embassy.

While such interviews traditionally are off-the-record, I am violating no confidences when I say that machine tools were several times mentioned—and in a favorable, understanding way. My conclusion: Their export situation looks decidedly brighter.

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Careful practices in construction, installation and operation of arc welding equipment can help significantly in eliminating damage to workers and property

SAFETY PRECAUTIONS IN Arc

ALTHOUGH much of the literature on welding is written from the viewpoint of hazards, arc welding is not essentially a hazardous process. There are, however, factors in arc welding practice which, when properly dealt with, will establish this process on a high level of safety among industrial processess; if neglected, accidents can and will happen.

Welding machines may be either direct current or alternating current. Direct-current welders consist of a generator with ampere and voltage characteristics suitable for arc initiation and maintenance, driven by a motor or, for locations where electric power is not available, by an engine, either gasoline or diesel. Alternating-current welders are of the two-winding air cooled transformer type with secondary (output) characteristics suitable for initiating and maintaining the arc.

The National Electrical Manufacturers Association has, over a period of years, developed standards for electric arc welding machines and kept these up to date as new developments or practices became established. These standards cover established practice in ratings, basis of rating, methods of test and broad overall principles of construction contributing to safety. They establish the industrial ratings of arc welders, both alternating current and direct current on the basis of 60 and 50 per cent duty cycles. In the case of alternating current transformer type welders, a third class is added, which is known as the limited input welder. The 60 per cent duty cycle machines covering ratings 200 amp and over are usually heavy duty welders. The 50 per cent duty cycle machines, ratings 200 amp and below, are intended for lighter welding operations, which usually do not involve continuous welding service. Limited input welders are designed primarliy for use on single phase circuits of limited capacity such as are found serving small shops, service garages and farms.

Fifty per cent duty cycle and limited input welders are essentially portable machines in that they are not used in a fixed location and, in general, not even in a fixed area. Consequently, standard practice is to provide these machines with primary service cable and fittings and with complete sets of welding accessories. Further, since they are generally used in locations and in shops where expert supervision is not available, they are usually listed by the Underwriters' Laboratories Inc. Direct and alternating current welders in the 60 per cent duty cycle class usually go into the industries where good supervision of installation and operation is available and consequently these machines are not listed by the Underwriters' Laboratories.

In addition to following recognized standard practices, the manufacturer can do a great deal to contribute to safe operation of the equipment through careful attention to details of construction, such as terminal markings, enclosures, internal wiring and wiring details.

These details are important for two reasons. The welding operator is exposed to the voltage on the output side of the machine, and every effort should be made by the manufacturer to foresee and eliminate any possibility of primary wiring coming in contact with secondary wiring under accidental conditions. Secondly, these details are important to safe maintenance operations.

Installation—Welding Circuit—The welding circuit, consisting of welding service cable for the electrode lead and work lead, electrode holder, ground clamps and connectors for providing extensions to the leads are included under the subject of installation. These parts are all subject to hard usage and abuse and, over a period of years, have been highly developed to meet both service requirements and safety requirements.

When welding lead cable extensions are necessary, substantial insulated connectors of the locking type should be used. The work lead (cable) is the most satisfactory means of providing the return circuit (ground) from the work to the welder. Some operating conditions may require using a steel structure or pipe line for the return circuit. Under such circumstances, precautions must be taken against creating

From data presented by the author before the National Safety Congress, Chicago, Oct. 21, 1948.

By W. W. REDDIE
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Buffalo

Welding

unsafe conditions, such as bonding the joints and making sure that no conditions of electrolysis or fire hazard exists.

Pipes carrying gases, flammable liquids, or electrical conductors, should never be used for ground returns. Pipes or structures used for ground returns should have all joints checked to make sure there is no sparking or heating that could constitute a fire hazard. Joints should be bonded if such structures are to be permanently used, and periodic inspections should be made to insure that no condition of electrolysis or fire hazard exists due to using these structures as conductors.

Electrode holders of many individual design types are available for the whole range of welding work from the lightest to the heaviest classes. These holders broadly fall into two classes, holders which are fully insulated and those which are insulated except for the electrode gripping jaws.

The insulated jaw holders were originally developed to protect the work from marring due to accidental contact or to provide some protection against accidentally leaving a bare holder in contact with the work, rather than to afford additional operator protection against shock.

Many bare jaw holders are still used but the trend is toward the fully insulated type. The fully insulated type should always be used with alternating current welders; if properly made, it will afford additional operator protection. Care should be taken to make sure that fully insulated holders do not have exposed screw heads on any portion of the holder that might come in contact with the operator.

Where service conditions permit, a continuous length of cable should be used from the holder to the machine, thus avoiding joints which if not well insulated could come in contact with the operator. This is usually satisfactory if lengths do not exceed 35 feet and a good grade of extra flexible welding cable is used. In no case should cable splices be permitted within 10 feet of the holder.

It seems almost elemental to repeat that, in the case of portable welders, either large or small, care should be taken to see that primary supply cables are kept free of the welding leads, and that welding leads on all welding machines, portable or stationary, are kept in order and so placed as not to tangle with the operator, other people or other objects near the welding operations; yet failure to observe these simple rules can and does lead to serious or even fatal accidents.

Welding Operations—The arc welding process is based on the use of an electrical machine to produce an electric arc, the heat of which is used to fuse metal parts together. High intensity heat is pro-

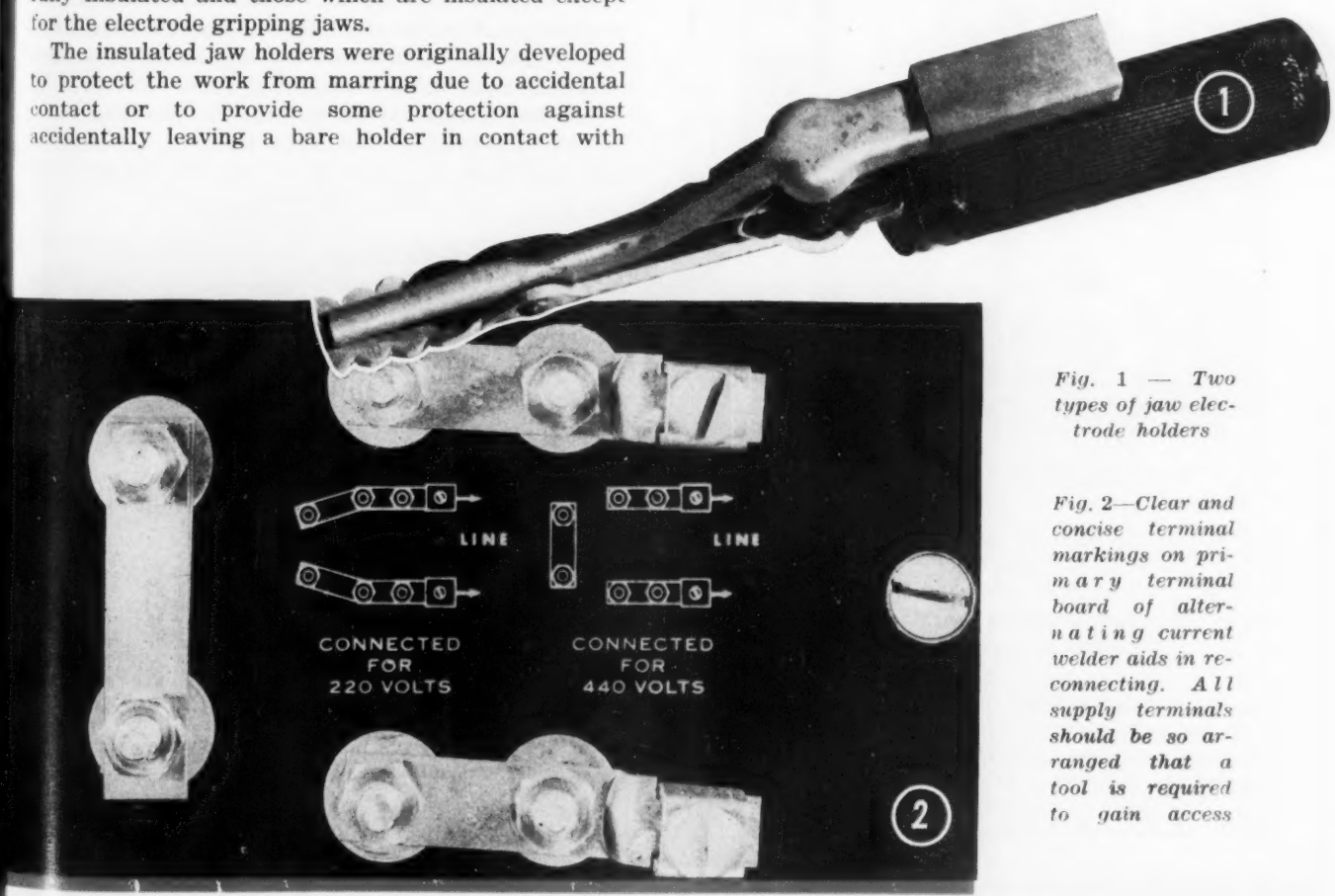

Fig. 1 — Two types of jaw electrode holders

Fig. 2—Clear and concise terminal markings on primary terminal board of alternating current welder aids in reconnecting. All supply terminals should be so arranged that a tool is required to gain access

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duced at a rapid rate at the arc between the electrode and the base metal or work, consequently there are strong radiations of light and heat rays and a considerable throw-off (spatter) of incandescent particles of slag and molten metal. Gases and fumes are generated at the arc during welding, and the character and quantity of which are related to the metal being welded, the type and diameter of electrode used, and the amount of current.

These conditions call for education and protection of operators from injury due to shock, burns and light radiation, provision for a suitable work area with ventilation as required by the character of work, and protection of property from fire.

Although adequate and efficient protective equipment and methods have long since been developed and are in general use, a brief review will be of value because some of the simplest precautions are frequently overlooked.

Referring first to electric shock, normally the work setup is such that the work is grounded, and unless care is exercised, the operator can easily become grounded. Voltage existing between electrode holder and the ground, during the off-arc or no-load period, is the open circuit voltage of the welder. The operator can become exposed to this voltage while changing electrodes, setting up work or changing working position, unless he is properly instructed and uses the equipment provided for his protection.

Open circuit voltages, direct current or alternating current required for satisfactory welding are low by comparison with voltages used on lighting circuits or other portable industrial tools and normally would not cause injury or severe shock. The fact that they are low may and does lead to carelessness, consequently, operators should be carefully instructed on how to avoid shock. The danger is particularly present in hot weather, when the operator is sweaty, or when he is wet. He should develop the habit of always keeping his body insulated from both the work and the metal electrode and the holder. Particularly, he should never permit the bare metal part of an electrode, the electrode insulation, or any metal part of the electrode holder to touch either his bare skin or any wet covering on his body. Consistent use of well-insulated electrode holders, well insulated cables, dry protective coverings on the hands and body, and insulation from ground will be helpful in avoiding contact.

Partially used electrodes should be removed from holders when not in use. The operator should have a place to lay down his holder or hang it up when not in use in a manner that will avoid contact with persons or conducting objects. Operators should further be instructed in checking this equipment to make sure that electrode connections and insulation on holders and cables are in good condition.

Maximum Open Circuit Voltage—In the interests of safety, the NEMA standards referred to establish the maximum open circuit voltage for industrial al-

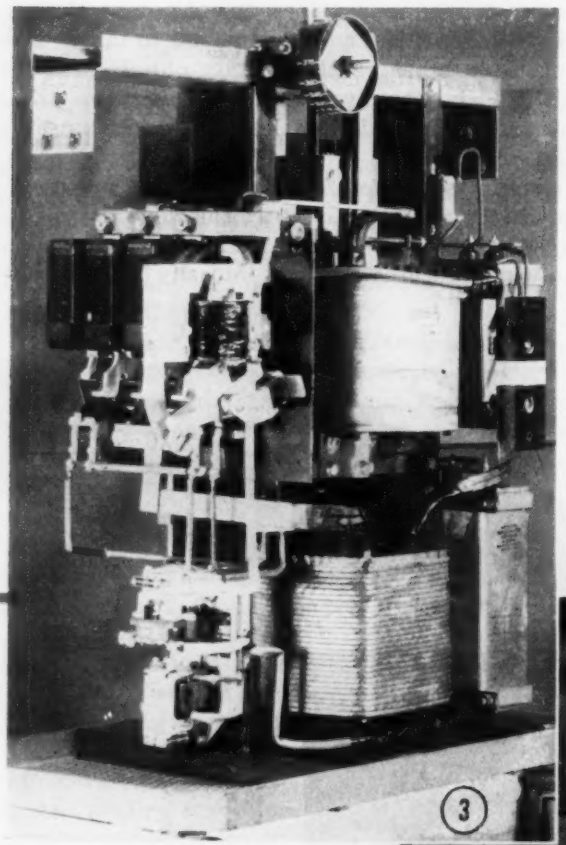

Fig. 3—Interior view of alternating current welder with automatic open circuit voltage control consisting of contactor and relay

Fig. 4—Operator welding on a large bedplate adjacent to an automatic welding operation just beyond the screen at the right. A portable folding screen shields operator in foreground

ternating current welders at 80 volts for manual welding and 100 volts for machine welding. The ASA code previously referred to names 100 volts for single operator direct current welders, 80 volts for alternating current welders when used on manual welding and 100 volts for alternating current welders used on machine welding as the maxima for open circuit voltages.

The above figures are root mean square values and are not set as safe values but as maximum values which need not be exceeded in good welding practice with all types of commercial electrodes. In fact, some types of electrodes are very satisfactory for operating at much lower open circuit voltages and some welders are so designed as to operate with any type of electrode at open circuit voltages substantially lower than these maxima.

Operating savings possible on most welding applications through the use of alternating current instead of direct current welders has rapidly expanded the use of alternating current welders, limited until recent years by lack of a complete range of electrode types that would operate satisfactorily on the lower open circuit voltages named above as standards. This progress has brought up the usual questions and discussions as to whether alternating current was more hazardous than direct current in the range of voltages used in welding. Investigations made by Dalziel and Lagan and published in the March, 1941 issue of *Electrical West* under the subject of "Practical Aspects of Electrical Shock", provides authoritative basic data on this subject.

Degree of shock injury depends upon current and not voltage. The current through the body is limited by the contact resistance at the surface of the skin and the body impedance. Contact resistance of dry skin may be as high as 100,000 ohms per square centimeter, but under extreme experimental conditions of wet hands and feet in the water, contact and body resistance may drop as low as 1000 ohms.

Fig. 5—Fully insulated cable connectors of the lock joint type. Bodies of connectors are removed from slip-over insulator sleeves

Data developed by Dalziel and Lagan show that any voltages either alternating current or direct current that are high enough for good arc welding are substantially higher than any voltage that could be considered safe in the sense that it would be considered harmless under the worst conditions represented by the lowest body resistance, yet our alternating current welding voltages are much lower than the 110-volts used on our lighting and domestic appliance circuits.

Voltage Controls—Automatic open circuit voltage controls, which automatically reduce the open circuit voltage to approximately 30 volts may be provided for alternating current welders used in outdoor work where operators may be working on wet steel where it is harder to keep dry, or for use in confined quarters where there may be greater probability of the operator getting across the open circuit voltage due to restricted space. Voltages used in alternating or direct current welding are not hazardous under normal operating conditions, but the data developed by these investigators emphasize the importance of instructing operators on how to keep conditions normal through the use of good cables, well insulated holders and attachments, dry protective gloves and clothing.

Personal protection of the operator from the radiant arc energy and from burns from spatter require suitable helmets with protective filter lenses, protective gloves and other protective clothing such as sleeves, capes, aprons and leggings depending on the size, nature and location of the work. Except for light work, flame-proof gauntlet type gloves should be used. Helmets or face shields should be used on all welding operations and care must be exercised to keep them in good condition. The helmet is primarily for the use of the operator and the use of face shields should be confined to inspectors or others who might have occasion to watch the welding.

Operators working close together or other workmen who might be in the immediate vicinity of an operator's arc should be protected by screens if proximity and conditions require. We have not seen any rules governing this point and shop conditions are so varied that fixed rules would be difficult to set. This is a condition which should be observed and corrective action taken if there are indications of trouble.

Goggles, clear or tinted, should be worn by operators, inspectors or other spectators in the vicinity when welds are being chipped and cleaned. Protective equipment for eyes, face and head should conform to the American Standard Safety Code for Protection of Head, Eyes and Respiratory Organs. Protective clothing is covered in the American War Standard Specification for Protective Occupational Clothing, L18.

Gases and Fumes from the Arc—Under ordinary

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Arc Welding

conditions, when the welding of clean carbon steel is carried on in large or well-ventilated areas with bare or coated carbon steel electrodes, experience has shown that no health hazard exists. Under certain conditions of welding, health hazards due to gases, fumes or dusts may be present. These possible hazards are not serious except when operating in spaces not properly ventilated, and are almost entirely due to the presence of gases, dusts and fumes containing lead, zinc, cadmium, fluorine or their compounds. When such hazards are present, sufficient ventilation or individual respiratory protection must be provided.

Harmful fumes or gases, containing lead referred to above, would be present when an operator is welding or cutting lead, lead-bearing steel or steel coated with lead-bearing paint. Zinc fumes would be present when working on galvanized steel, brasses or bronzes, or steel coated with zinc-bearing paint. Steel parts are frequently coated with cadmium to prevent corrosion when used in industrial work; welding on such steel gives rise to cadmium-bearing fumes.

Coatings on stainless steel electrodes contain compounds bearing fluorine which has doubtless given rise to erroneous thinking on stainless steel welding. These compounds are extremely stable and experimental work indicates that, under ordinary conditions of use, harmful amounts of fumes are not produced from stainless steel welding, yet it is important that good ventilation always be provided when this class of welding is being carried on.

Some nitrous oxide is present in all welding, yet experience shows that harmful effects from this gas are found, with the possible exception of welding done in extremely confined spaces, without ventilation.

Welding Locations—Three cases will be considered briefly under the subject ventilation: 1. Welding in the open air—outside; 2. welding indoors; and 3. welding in confined spaces. The following brief recommendations applying to these three cases will be helpful: Positive ventilating devices for fume removal or respiratory protective equipment are not required in welding operations conducted in the open air, except when an operator is engaged in welding or cutting lead or cadmium-coated metals or metals covered with lead, mercury or cadmium-bearing paint. The operator must not breathe appreciable quantities of such fumes. Local exhaust ventilation can be used to draw the fumes away from the operator or respirators can be worn. Respirators are relatively inexpensive and provide good protection.

For continuous welding operations indoors, in industrial practice, it is generally considered that if an operator has less than 10,000 cubic feet space allowance, ventilating fans which will assure three to four changes of air per hour should be installed. For less extensive, intermittent or even occasional welding in small shops, care should be taken to see that open windows, doors or roof vents provide air changes. If this cannot be arranged, an exhaust fan should be installed. Positive ventilation, such as an air suction line, should be provided to exhaust the fumes arising from welding or cutting metals containing, or coated with, lead, zinc, cadmium or mercury.

All welding or cutting operations carried on inside relatively small, enclosed or restricted spaces such as tanks, boilers or pressure vessels must be adequately ventilated by forced ventilation. Investigations and studies made over a period of years, supplemented by experience show that permanent harmful effects on the operators health are not experienced in the course of welding operations, and that ventilation can readily be provided to take care of conditions outlined above which require it.

Fire Prevention—Production welding operations are normally carried on in regularly authorized shop areas, which are and should be kept free from combustible materials, oil, grease, waste, etc. Welding construction or maintenance operations, usually carried on in a variety of locations outside authorized areas, should not be started until authorized by a person or persons to whom such authority has been delegated by the management.

If, during the course of any welding operation, combustible material has been exposed to sparks or heat, a watcher should remain on the job for at least 30 minutes after completion of the work to make sure that no smoldering fires have started.

New Steel Machined Up to 25% Faster

Announcement of a new steel which can be machined from 10 to 25 per cent faster than the fastest standard free-machining bessemer screw steel is made by Jones & Laughlin Steel Corp., Pittsburgh. Furnished in cold-finished bar form, the steel is said to promote increased production and lower costs in the manufacture of nuts, screws, studs, fittings and other machined products. It is reported to have a machinability index of 170.

Smoother finish after machining, better cold working and cold forming properties and longer tool life on screw machines are additional features. During experimental stages, the "E" steel, as it is designated by the company, was tested by 45 different industrial manufacturers who used a total of 6178 tons in the tests.

Roll Transport Truck

Problem of handling long, heavy cylindrical objects may be solved with an electric power truck equipped with long, low-lift platform and having two parallel rows of pipe sockets to hold the load in place. Platform of truck, made by Elwell-Parker Electric Co., Cleveland, is 140 inches long and 40 inches wide. When elevated, its top is 30 inches above floor level; lowered height is 24 inches and the load capacity is 6000 pounds.

—o—

Available as optional equipment for the D6N towing winch, made by Hyster Co., Portland, Oregon, is an automatic brake. The brake lever is set before winching so that when the drum stops winding, the brake automatically engages, thereby holding the load in place. Since the single pawl or dog carried by the revolving arm is retractable, it does not click against the ratchet teeth in the rim with resultant noise and wear.

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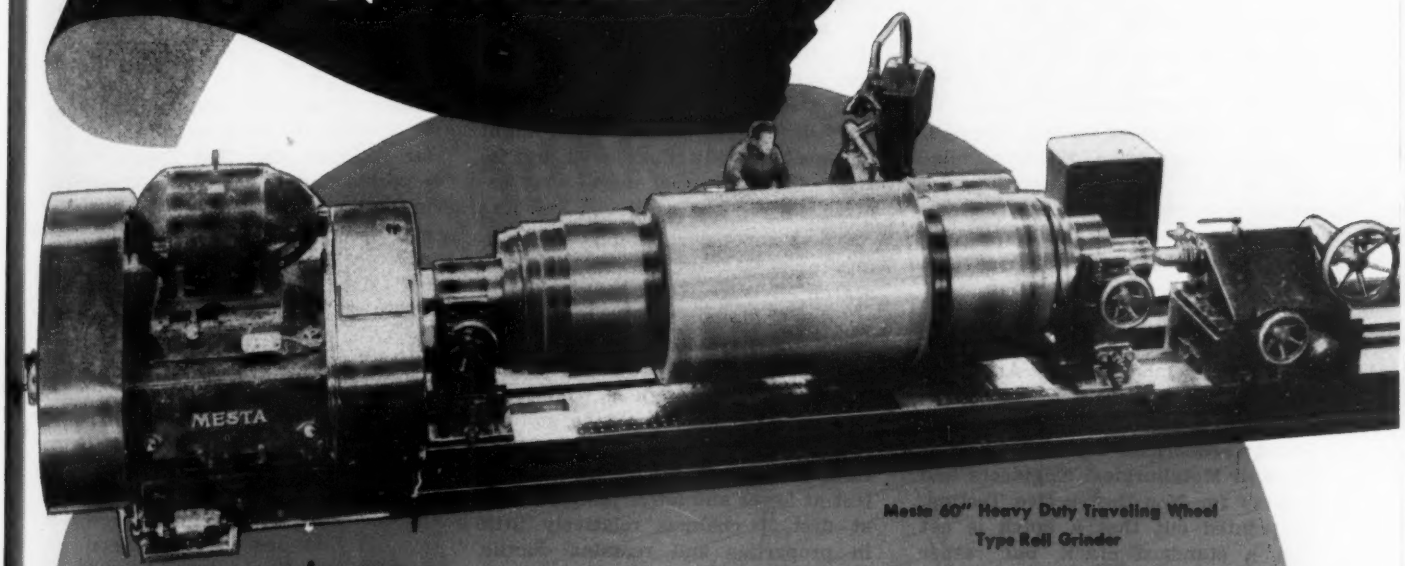

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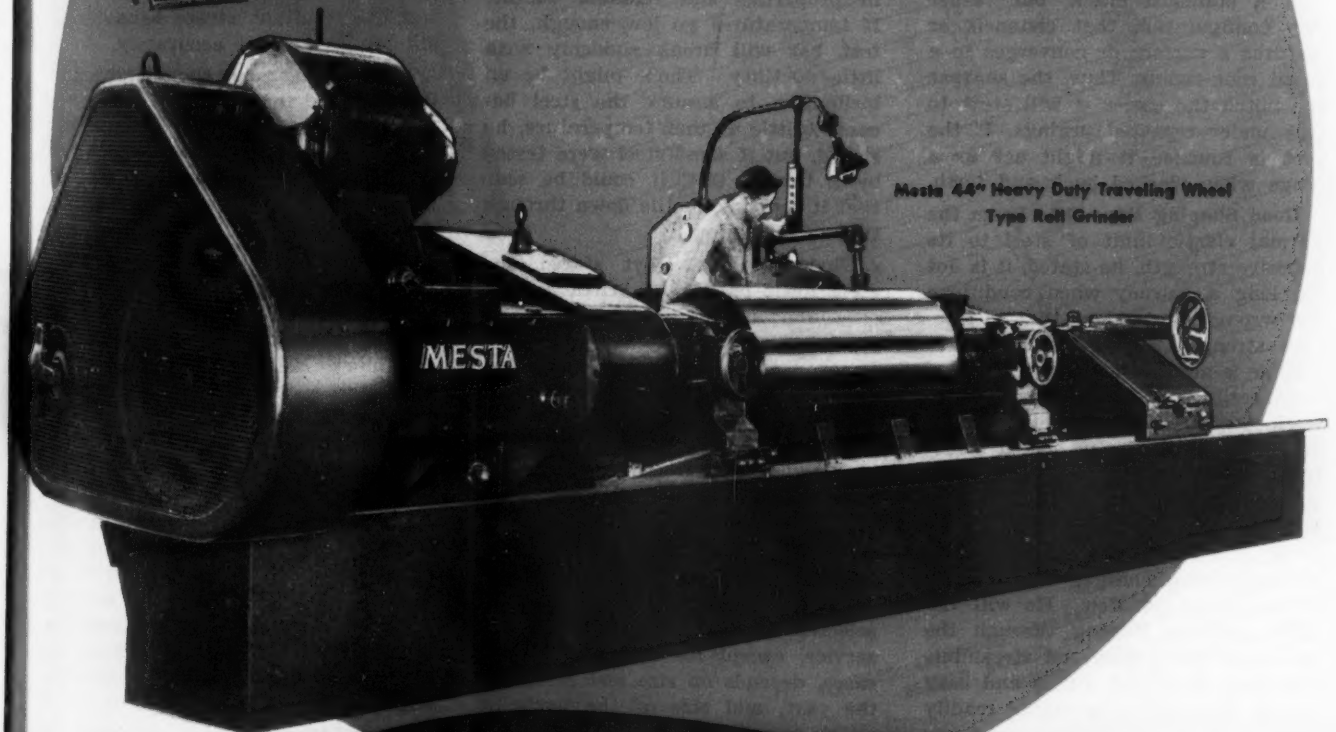

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TECHNICAL HIGHLIGHTS

. . . . of Western Metal Congress

Emphasis of technical papers presented at the sixth ASM-sponsored gathering placed on western industries, such as oil, aviation and light metals. Some of the presentations covering metallurgical, welding and testing subjects are summarized

PARTS that fail in service should be returned to the engineer to "design out" built-in notches rather than to the metallurgist for a detailed report on microstructure, Francis G. Tatnall, manager of testing research, Baldwin Locomotive Works, Philadelphia, told visitors attending the technical sessions of the sixth Western Metal Congress and Exposition in Los Angeles, Apr. 11-15, STEEL, Apr. 18, p. 56.

Speaking in Shrine Convention Hall, where many papers were presented by members of the American Society for Metals, American Welding Society, American Foundrymen's Society, American Institute of Mining and Metallurgical Engineers and Society for Non-Destructive Testing, he pointed out that a notch is not just a standard crack, but rather any configuration that channels or disturbs a surface or converges to a small root radius. Thus, the sharper the notch the easier it will start to tear under repeated urgings. If the root is rounded it might act as a hinge when worked back and forth.

Good Shaping Pays Off—From the normal elastic limit of steel to its cohesive strength, he stated, it is not too long a journey when conditions are wrong. It is clear that if fracture strength is high, resistance to fatigue is also upped proportionately. Engineering and metallurgy can work together, Mr. Tatnall pointed out. If a dynamically loaded structure is to be fashioned from materials selected by the metallurgist as a compromise between notch sensitivity, mechanical strength and cost, the engineer is charged with a study of the shape function. He will visualize stresses flowing through the structure like a fluid and streamline this fluid flow with fillets and easy curves. Because fluids cannot readily turn sharp corners, abrupt changes in section with sharp corners will contain vacuums or turbulence when bypassed by the main flow. In a structure, vacuums are idle metal and turbulence, and stress concentration.

If laboratory failures differ from service failures, the engineer must try to reproduce service failures in the laboratory though it may show him paradoxically that tension members are failing in torsion. He then must deduce the reason, which might be most quickly discovered by fatigue testing actual parts and assemblies.

Low-Temperature Metals—According to S. L. Hoyt, metallurgical research advisor, Battelle Memorial Institute, Columbus, ductile insensitive metals offer no special metallurgical problem when used at low temperatures. If the design is right, the part or structure should be suitable for low-temperature service. If structural steel is tested by the tension test at lower and lower temperatures, at first it changes relatively little in properties and remains ductile. If temperatures go low enough, the test bar will break suddenly with little ductility. There might be an inclination to assume the steel became brittle at that temperature, he stated, but if same steel were tested by a torsion test, it could be seen that it remains ductile down through that temperature.

Obviously, Mr. Hoyt stated, the steel itself cannot be brittle in one case and ductile in another. This must be due to the difference in the stress systems of the tension test and the torsion test. Common experience shows that large parts or structures are more apt to fail than smaller parts or structures under presumably the same condition (at low temperature). Large parts are more difficult to produce with a fine structure and good metallurgical quality than small parts. Therefore selection of steel for low-temperature service, except for relatively simple cases, depends on size and design of the part, and size of the parts of which the structure is composed, as well as upon service temperature and stress conditions. Sharp radii or notches should be avoided, whether put in intentionally in design or by accident.

Strain Behavior Erratic—In studying the forming of high-temperature alloys for aircraft components, John F. Tyrrell, research metallurgist, Solar Aircraft Co., San Diego, Calif., reported that the behavior of metallic materials below the elastic limit of stress can normally be predicted accurately on the basis of a small number of simple tests, because of constant proportionality in this range between applied stress and resultant strain. When the elastic limit is exceeded, however, the proportionality between stress and strain is no longer constant but decreases by an exponential relationship to the point where necking begins. Beyond this point, the geometry of the stress system becomes extremely complex and the resultant strain behavior is difficult to analyze accurately.

Forming, he said, should normally be restricted to the plastic range below the point at which necking begins. The relationship between stress and strain in this range is one of the factors which determine formability characteristics.

Constitution of Matter — A new theory for the physical constitution of matter was presented by Carl Zapffe, consulting metallurgist of Baltimore. As far as the solid state is concerned, the theory is summarized as follows: The solid state in general, and the solid state for metals in particular, is a condition of aggregation of subcrystalline units of colloidal dimensions, tentatively termed micelles, originating or existing within the previous liquid or gaseous state and carrying aspects of their definition and separateness into the solid state as an inherently discontinuous structure on a colloidal scale.

All mechanical phenomena, such as plasticity and cleavage, and all physical phenomena, such as optical, electrical and magnetic properties, then depend upon and/or involve the intermicellar surfaces; and chemical phenomena, such as transformations and precipitations, nucleate within or

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⅜	.065	16	.028	24
½	.083	14	.022	24
⅝	.095	13	.022	24
¾	.095	13	.022	24
⅞	.095	13	.022	24
1	.095	13	.022	22
1⅛	.095	13	.028	22
1¼	.095	13	.028	22
1⅜	.095	11	.028	22
1½	.120	11	.028	20
1⅝	.120	11	.035	20
1¾	.120	9	.035	20
1⅞	.148	9	.035	20
2	.148	9	.035	20
2⅛	.148	9	.035	20
2¼	.120	11	.035	20
2⅜	.148	9	.035	20
2½	.120	11	.035	18
2⅝	.148	9	.049	18
2¾	.120	9	.049	18
2⅞	.148	9	.049	18
3	.148	9	.049	18
3⅛	.148	9	.049	18
3¼	.148	9	.049	18
3⅜	.148	9	.049	16
3½	.148	9	.065	16
3⅝	.148	9	.065	16
3¾	.148	9	.065	16
3⅞	.148	9	.065	
4	.148	9		

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develop with respect to this inherited internal surface, Mr. Zapffe stated.

No single encompassing proof is known to exist for the theory here presented it was said, unless it lies in the strongly convincing cleavage patterns observed in fractography. Instead, the concept is rather the integrated result of an extensive review of nonideal behavior in many fields. An extended re-examination of many separate aspects will therefore be required before the theory can be satisfactorily tested, he related.

Search Rewarded—Boron steels are the result of a search for a material with an ample hardenability, capable of providing the necessary mechanical properties to achieve field service success, and yet to make possible the most economical fabricating operations with a consequent low cost of production. This fact was brought out in the paper presented by F. J. Robbins, vice president, and J. J. Lawless, assistant metallurgist, Plomb Tool Co.

It has been established that boron steel is well suited to production shop heat treatments in either conveyorized furnaces or batch furnaces, the speakers stated. The material is relatively insensitive to quenching temperatures, developing full surface hardness (in the range of 55 R) when quenched at 1525° F, and producing satisfactory properties even when quenched at higher temperatures. It was said to possess certain characteristics which place it within the list of lean alloys, so far as properties and hardenability are concerned.

In certain fields of application, the material bridges the gap between straight carbon steels and lean alloys, enabling the metallurgist to specify a material that will fulfill the requirements of the application more closely than either a lean alloy or a straight carbon steel. It was related that nothing known to the authors indicates boron steels could entirely replace any of the alloys which over many years of use have come to be considered standard.

Hot Working Boron Steels—Concerning a new class of steel, containing about 0.01 to 0.03 per cent boron, and at least six times as much titanium as carbon, George F. Comstock, assistant director of research, Titanium Alloy Manufacturing Division, National Lead Co., Niagara Falls, N. Y., stated that in view of the stabilization of the carbon by titanium, such steels can be hot-worked at 1850 to 2000° F in spite of the boron content. Columbium can be used in place of titanium, he added.

On cooling in water or air from about 2000 to 2200° F, these steels harden to about 75 Rockwell B or more, and the hardness is further increased by tempering at 1000 to 1200° F. In this condition, he continued, the room-temperature strength is about doubled as compared to the strength normalized at 1600° F, with only a slight decrease in ductility, a considerable decrease in impact value, and a marked improvement in stress-vs.-time-for-rupture values at 1000 to 1100° F.

The speaker brought out that plain boron-titanium steels heat treated as specified withstands 50,000 psi at 1000° F for 1000 hours. With chromium added the 1000-hour rupture stress is about 30,000 psi at 1100° F, or 18,000 psi at 1200° F. Titanium-boron steels, even without chromium, do not graphitize in 5000 hours at 1100° F although fully killed with aluminum.

Sonic Problems—Erosion produced by the elements at subsonic and supersonic speeds may develop to be one of our greatest problems to combat, stated T. E. Piper, chief materials and process engineer, Northrop Aircraft Inc., Hawthorne, Calif. To date, he added, no surface coating has been developed.

Another problem faced by designers and metallurgists with high speed aircraft is that of temperatures created by ram compression or air friction on the skin surface at extreme high speeds. At sonic speeds through the intermediate speeds up to 1700 miles per hour, the skin and subsequently the structural members will have reached temperatures at which substantial deterioration of the physical properties of common airframe materials have occurred.

What titanium and molybdenum alloys have to offer for aircraft is yet to be determined. The speaker said that, to his knowledge, they do not excel in modulus-density ratio above the present known materials. A clear material having suitable optical qualities for use on enclosures of high speed airplanes has yet to be developed that will withstand higher bursting loads when exposed to the heat and erosion of high speed.

Greater Under Static Conditions—Dr. D. S. Clark, associate professor of mechanical engineering, California Institute of Technology, Pasadena, reported that the ultimate tensile strength of all materials which were tested (ingot iron, carbon steels of different carbon content, several alloy steels, stainless steel type 302, copper, aluminum, two aluminum alloys, four magnesium alloys and a zinc base die casting alloy) is greater under dynamic conditions than under static conditions. The results of tensile impact tests in which force-time relations are determined can be placed on a rational basis through the concept of the theory of plastic strain propagation, he stated.

Curves of percentage elongation versus impact velocity fall into three general types of which the most outstanding is the type in which the percentage elongation increases with increasing impact velocity to a maximum corresponding to a critical velocity beyond which the percentage elongation decreases. Cold worked metals and alloys exhibit this type of curve, it was brought out. Most annealed materials show little change of percentage elongation with increasing impact velocity until the critical velocity is reached, at which the percentage elongation decreases markedly.

Ultimate strength of all materials considered is not less than the static value when determined at impact velocities between 25 and 200 ft/sec. In most cases the dynamic ultimate strength is greater than the static value.

Hydrogen in Steel—According to W. D. Briggs, chief chemist, Northrop Aircraft Inc., Hawthorne, Calif., airframe manufacturers are becoming alarmed at the increasingly stringent requirements being imposed for the relief of hydrogen embrittlement in steel. Perhaps the critical amount is the factor to be considered in the technological development.

Almost every step of fabrication from the foundry to the finished plated part offers posible sources of deleterious hydrogen, it was pointed out. In the foundry hydrogen may be introduced in alloying such as the addition of unannealed electrolytic nickel. During casting hydrogen may be liberated from the decomposition of water in wet sand molds, some of which can penetrate the metal. The atmosphere of the furnace in which the material is heat treated can be adjusted to cause hydrogen embrittlement. Cold working steel, especially after heat treatment, produces an optimum susceptibility for hydrogen embrittlement, by producing a great number of planar imperfections, Mr. Briggs said.

Airframe manufacturers are using large quantities of high strength steel alloys and are making every effort to reduce the possibility of failure. Even so, procedures for relief of possible hydrogen embrittlement vary from one extreme of baking at 375° F all plated parts harder than Rockwell C-32, to the other extreme of baking only springs and flexural parts which are harder than Rockwell C-40.

Alloy Steel Welding—Speaking be-

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fore a technical session at the Biltmore Hotel, John J. Chyle, director of welding research, A. O. Smith Corp., Milwaukee, said that in the welding of alloy steels, consideration must be given to the weld metal composition to obtain the special requirements that are needed, such as tensile strength or other related mechanical properties and corrosion resistance. He went on to say that the metal arc welding electrode with shielded coating offers wide possibilities in experimental composition of welding metal by the introduction of various alloying elements, either through the coating or through the core wire, or by a combination of both.

Ease of incorporating alloying elements in the coating of an electrode makes it possible to have a wide variation in compositions of any single alloying element, as well as combinations of alloying elements. The more common alloying elements incorporated in weld metal are vanadium, molybdenum, manganese, chromium, nickel, silicon and copper.

Consideration must be given to the location of welds, that they may be accessible for thorough inspection. Where high tensile welds are used, and where failure of such welds may result in loss of life or great property damage, accessibility is of extreme importance, Mr. Chyle stated. For critical welds it is necessary that both sides of completed welds be accessible for the various methods of inspection. Nondestructive inspection such as radiography and magnetic particle inspection are most commonly used. Other methods such as oils and supersonic testing also are employed.

Welding Thick Aluminum Plates—Research on welding of thick aluminum plates and shapes, described by C. B. Voldrich, chief welding engineer, Battelle Memorial Institute, Columbus, O., has demonstrated the practicability of welding them into useful engineering structure. He reported the tests show that for the aluminum alloy 3S, welding and filler metals are now available which will produce weld joints with strength and ductility approaching those of the base metal. These strength properties do not change, but even improve, at the low temperatures encountered in operation of equipment such as that for oxygen manufacture.

Investigations also show that at least some of the heat-treatable aluminum alloys now can be welded in thick sections, with weld-joint strengths far greater than those obtainable with the common alloys, 2S and 3S.

New and different methods of welding aluminum are being studied and applied, he continued. These range from welding at room temperature (no heat applied to the work) flash welding and submerged-melt welding to methods in which arc welding is done with bare aluminum electrodes in shielding atmospheres.

Tensile Strength of Brazed Joints—In a tension test, the performance of a single piece of metal and of a brazed specimen may differ basically. The assembly is comprised of the two components which are joined, the layer of brazing alloy and the inter-faces. So stated A. M. Setapen, manager, Engineering Division, Handy & Harman Co., New York, and C. D. Cone, Bridgeport, Conn., the company's chief metallurgist, before a Biltmore Hotel session.

Tensile strength of butt joints brazed with silver alloys is influenced by the degree to which the materials being joined are wet by and bonded to the brazing alloy, thickness of the brazing alloy layer in the joint itself, strength of metal or metals being joined, amount of flux inclusions or voids in the joint and the mechanical characteristics of the structure.

The strength of the brazing alloy itself, which is approximately 70,000 psi, is of significance only in that when materials weaker than this are joined, tension failure will usually occur outside the joint. Most metals when properly fluxed, are readily wetted and bonded by low temperature silver brazing alloys and the bond strength will be greater than the strength of the brazing alloy itself, the speakers asserted. In certain cases, particularly in alloys containing aluminum, special fluxes are required to achieve this wetting.

Copper and brass rods, butt brazed, may be drawn down to fine wire and plates having a cladding of other metal brazed to the face may be rolled into thin sheets. T or L-joints in plates or sheets of ductile material can be hammered flat without breaking, they stated.

Underbead Cracking—Application of metallic arc welding to hardenable alloy steels has led to difficulties because of cracking the steel under the weld bead, it was stated in a paper by Raymond S. Stewart, assistant chief, Physical Metallurgy Division, and Stephen F. Urban, director of research, Titanium Alloy Mfg. Division, National Lead Co., Niagara Falls, N. Y. The underbead cracking tendency increases with the hardenability, but there are other factors that markedly affect the susceptibility of a steel to this type of cracking, they reported.

Among these are the microstructure as influenced by the steel's thermal history, and small variations in chemical composition. An increase in the soluble aluminum content reduces cracking if the steel is given a subcritical anneal prior to normalizing. The aluminum accelerates coalescence of carbides.

Titanium in the steel, it was said, decreases underbead cracking by forming stable carbides. An increase in the manganese content of titanium steels is effective in counteracting the lowered yield strength. Properties of these higher manganese steels show that titanium reduces underbead cracking as normalized and drawn and practically eliminates underbead cracking when a spheroidizing anneal precedes the normalizing at the same yield strength as the standard steel.

The effect of columbium on the higher manganese steel is similar to that of titanium, it was asserted. Zirconium raises the yield strength to above that of the standard 4130 steel, except for the 0.30 per cent zirconium steel that had been given the spheroidizing anneal. Vanadium, up to 0.15 per cent, at least raises the yield strength of the standard steel. Underbead cracking of the zirconium steels depends almost entirely on the zirconium content, and is influenced very little by additional silicon or aluminum added to the ferroalloy.

Identical Cast Parts—Albert W. Merrick, chief metallurgist, Austenal Laboratories, New York, in his presentation said that in a span of 10 years has occurred the evolution from the stage of hand craft and artisanship to partly automatic methods of producing identical parts in mass production quantities by investment casting. As a result it has accomplished with metals of higher melting points what had previously been done by die casting in lower melting point metals. Actually there is no metal or alloy that cannot be used, that is castable by ordinary foundry processes.

For commercial production, the speaker reported the presently practical upper limit of casting temperatures to be about 3200° F, which means metals that melt at temperatures somewhat lower. Where parts are complicated or alloys difficult to machine, investment castings very often offer important economies. Because of their accuracy and lesser amount of required finishing, they often compete favorably with sand castings—especially on small parts, he said.

Radioactive Silver Tracers—Rate of surface diffusion for silver on silver has been measured at three tem-

(*Please turn to Page* 114)

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TURBO-HEARTH STEELMAKING

Combines Benefits of Bessemer and Open Hearth

Extra heat from more complete combustion of carbon is used in revolutionary new process to produce steel low in phosphorus and nitrogen from basic pig iron. Steel is made in partly closed side-blown vessel

BASIC principles for making steel rapidly in a new vessel called a "turbo-hearth" have been established by pooling the research of two major steel producers. The new method is said to permit the manufacture of steel of open hearth quality, low in phosphorus and nitrogen, by directing jets of air across the surface of white-hot liquid pig iron.

Announcement of this new development was made jointly by spokesmen of the two collaborating units—Dr. E. C. Bain, vice president, Carnegie-Illinois Steel Corp., and H. W. Graham, vice president, Jones & Laughlin Steel Corp., both of Pittsburgh. Credit also was given to C. E. Sims, of Battelle Memorial Institute, Columbus, who assisted Carnegie-Illinois with research proposals.

The turbo-hearth was developed, the companies stated, in an attempt to combine the advantages of the basic open hearth and acid bessemer processes, the two leading methods followed by steelmakers in the United States. Turbo-hearth steel is made in a partly closed, side-blown vessel, lined with refractory similar to that used in the Thomas basic bessemer process.

Fast Chemical Action—Brick lining of the vessel is magnesia rather than silica. As in the bessemer process generally, heat is supplied by chemical reaction of the blown air with carbon and other elements of the charge. Chemical action is fast and direct, but subject to controlled conditions which reduce the nitrogen and phosphorus contents, a condition which is said to make turbo-hearth steel comparable to open hearth steel, hence suitable for more general use than the customary bessemer steel.

Acid bessemer and the basic Thomas processes have an advantage over other steelmaking processes, it was brought out, in that neither requires fuel from external sources. The choice between them depends upon the relative silicon and phosphorus contents of the iron that can be made from available ores. The reactions between the oxygen of the blast and the several elements in the liquid iron charge supply enough heat units to produce steel with sufficiently high temperature for subsequent finishing and teeming.

High-silicon iron used in the bessemer converter and the high-phosphorus iron in the Thomas operation are required largely because carbon, the predominating heat-producing element in the charge, is not completely utilized. Combustion of the carbon in the vessel proceeds only to the carbon monoxide stage, so that two-thirds of the potential heat from the combustion of carbon is lost when the monoxide burns to carbon dioxide in the air outside the vessel. Conservation of this heat has been practiced for years by producers of small, intricate castings. This has been accomplished with low-phosphorus iron and without excessive silicon by introducing the air at the side or on the surface of the converter charge in such a manner that sufficient oxygen is available to burn carbon to carbon dioxide inside the vessel.

According to the developing companies, these facts suggested that it should be possible, by directing jets of air on the surface of liquid iron to utilize the extra heat from the more complete combustion of carbon to produce steel from American basic pig iron. The turbulence created by the impinging air could be expected to accelerate greatly the refining reactions.

Possible applications for such a process, asserted its sponsors, are: Production of low-nitrogen steel in an acid-lined vessel, utilization of conserved heat to melt larger amounts of scrap, and use of a basic lining for producing steel low in both phosphorus and nitrogen contents.

Low Nitrogen Content—Jones & Laughlin research in the first two of these three phases had progressed so far that in 1942 a specially designed acid-lined, side-blown converter of 3½ tons was installed at its Aliquippa, Pa., works. Approximately 200 blows were produced and a large percentage of the ingots converted to commercial products. The consistently low nitrogen content and favorable metallurgical properties of the steel were sufficiently promising to warrant construction of a full-scale converter as a next step. Accordingly, a vessel of 22 tons capacity was built. Initial trial was delayed by the war, but late in 1946, the acid-lined vessel produced a number of blows for both duplex metal and steel ingots.

Carnegie-Illinois technologists approached the third problem—that of making low-nitrogen, low-phosphorus steel of open-hearth quality from pig iron of a composition normally used in the basic open hearth. With the benefit of technical proposals of Battelle Memorial Institute a co-operative project was inaugurated to develop the possibilities of this process. This was done by directing jets of air on the pig iron bath in a basic-lined vessel.

A turbo-hearth of 1000-pound capacity was built at Battelle Institute with special facilities for making temperature measurements and taking samples of slag, metal and gases without interfering with operation. A sufficient number of trials were made in 1947 and 1948 to establish basic operating and metallurgical characteristics of the new process.

Process Fundamentally Sound—In the course of the development work the interests of Carnegie-Illinois and of Jones & Laughlin converged and they conducted further research on a joint basis. Encouraging results obtained with the small turbo-hearth and availability of the Jones & Laughlin commercial-size unit led to the installation and relining of the latter with basic refractories last year at South Works of Carnegie-Illinois in Chicago. The larger vessel is said to have performed as expected.

Operating difficulties such as are generally associated with the development of a new process have not yet been completely overcome, it is reported by the companies. Experience gained during this work, however, has shown to their satisfaction that the turbo-hearth process is fundamentally sound and that operating problems are not insurmountable.

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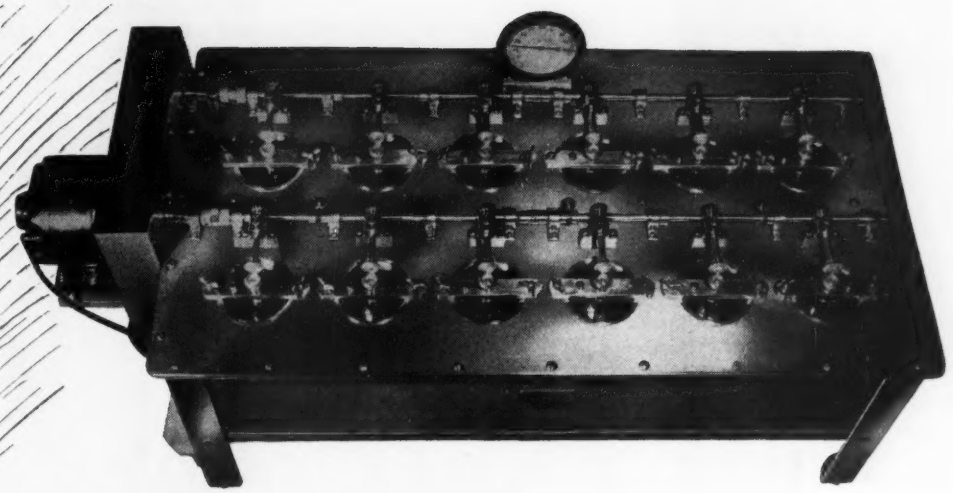

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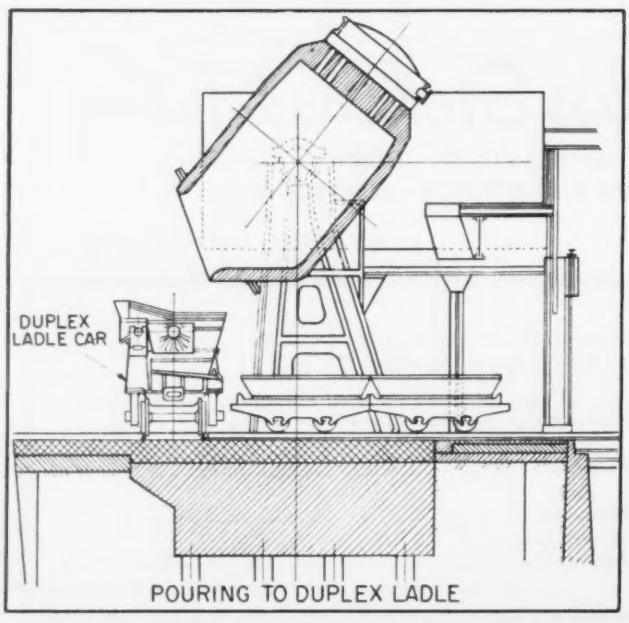
PART III

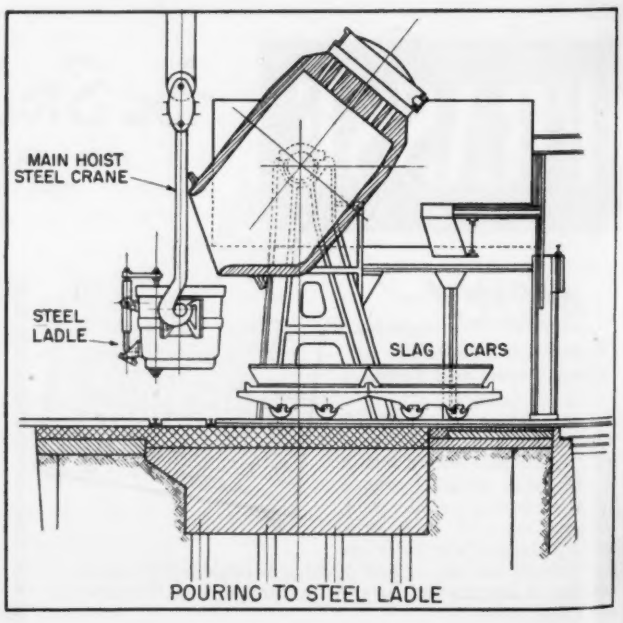
DUPLEX blown metal requires no alloy addition and is poured from the converter into a hot metal ladle for transfer, maintaining as clean a separation of metal and converter slag as possible. Carryover of slag in excess of that sufficient to insulate the metal from heat loss is undesirable, since it is predominantly acid and would be detrimental to the basic process to follow.

Additions can be made to the converter bath before pouring into the bessemer teeming ladle if the plant layout includes a charging platform on the pouring side of the converter. Ferromanganese, spiegeleisen or other heavy materials may be added in this manner, however, general practice is to add all materials to the ladle while metal is being poured from the converter. The addition does not commence until a pool of metal has been formed in the ladle, and effort is made to complete it before the ladle is more than three-quarters filled to secure the advantage of the mixing action caused by addition of the remaining quantity of metal. Materials such as coal or limestone that evolve gases under the action of heat are sometimes added to increase normal turbulence of the metal during pouring. When possible, alloying materials are crushed to a size small enough to insure their complete solution, but very fine sizes are avoided.

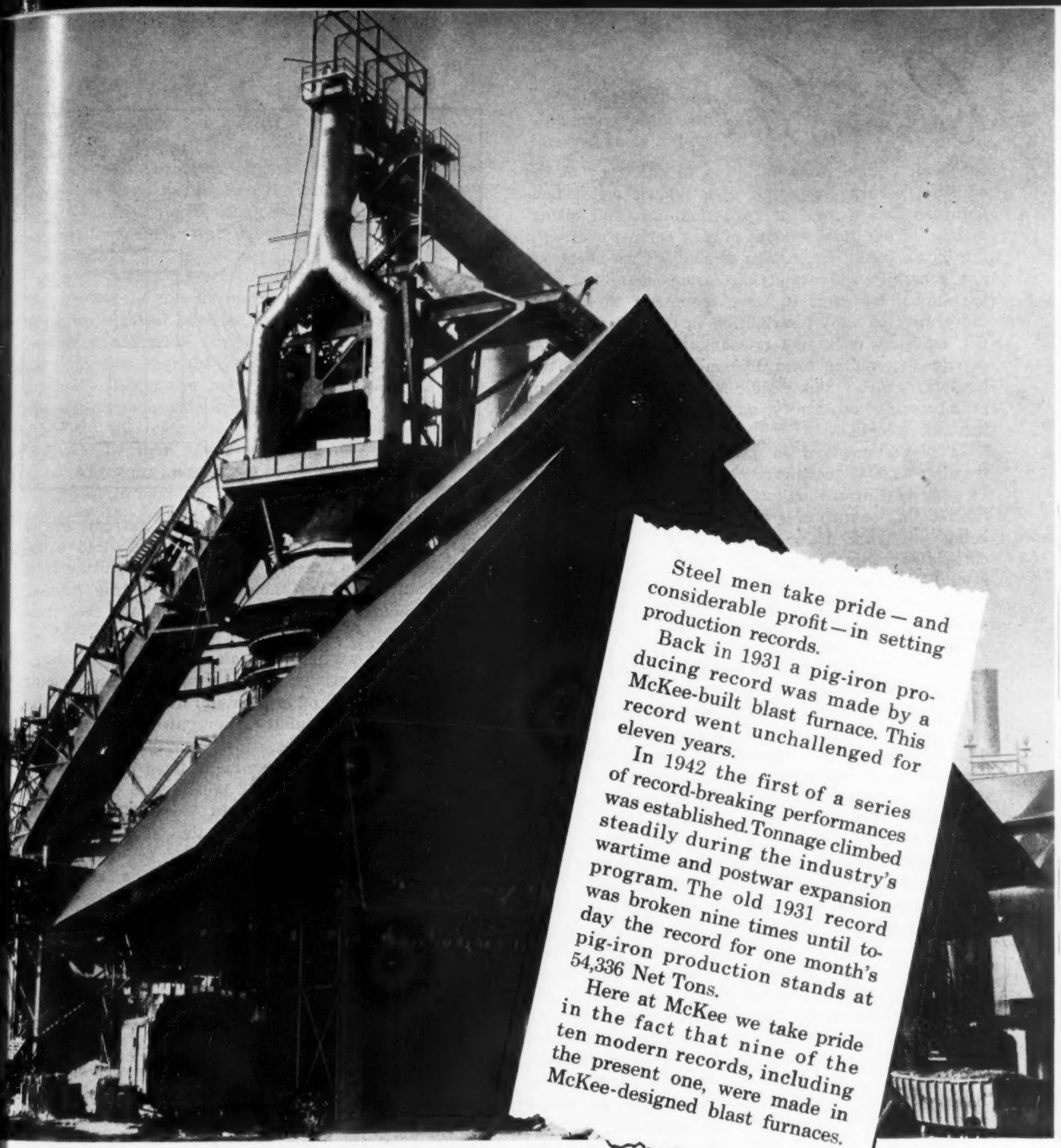
Amount of the alloying addition is determined by the operator who considers percentage of alloy increase required (specified analysis less residual analysis), percentage of alloy contained in the addition, expected efficiency of the addition, and weight of



POURING TO DUPLEX LADLE



POURING TO STEEL LADLE



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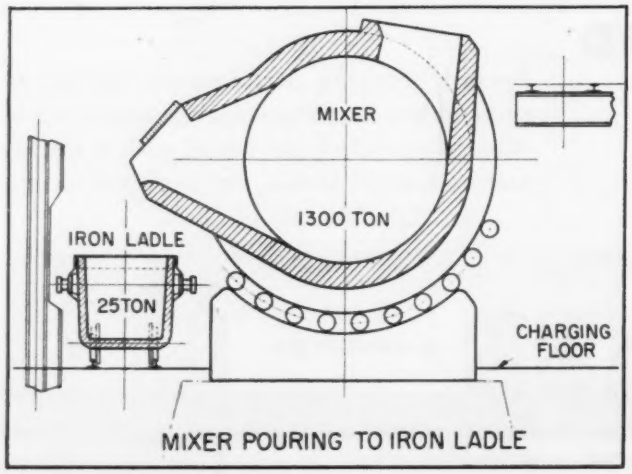
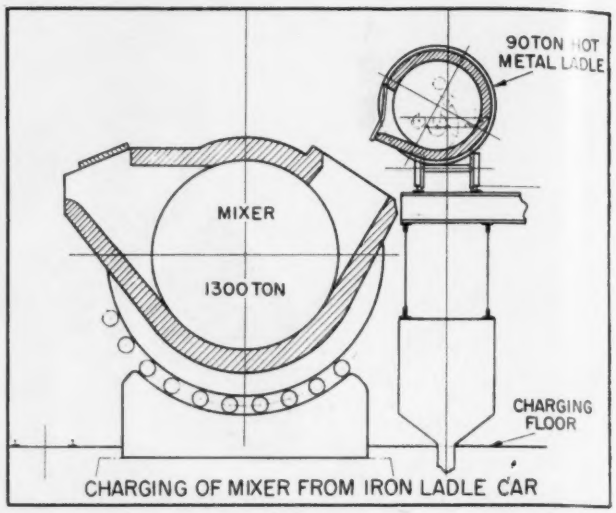
the heat. Considerable variation in efficiency of the addition occurs depending upon blown metal temperature and degree of oxidation, material sizing, method of addition, amount of slag carried over with the blown metal, etc. Range of analysis specifications are generally wide enough to compensate for such variations, however. In some instances, to increase uniformity of alloy distribution in the finished product, additions such as ferromanganese are preheated or added in molten form. Pouring the product of two converters into a single ladle is also used as a means of increasing uniformity, as well as simplifying the teeming operation.

In plants engaged in production of ingots, the teeming ladle is transferred by crane or hoist to the teeming platform. Further treatment of metal during the teeming operation is determined by the type steel being produced. These types fall in the following categories: Rimmed or open steels, capped steels, semikilled steels, and sound killed steels. Only deoxidation treatment given open steels results from a ladle addition of ferromanganese and small amounts of aluminum or ferrotitanium, followed by a mold addition of only enough aluminum to control rimming action, and prevent excessive rise or drop of the metal while gaseous effervescence and solidification proceeds. Rectangular open top molds are generally used for this type of ingot. Capped steels are deoxidized in much the same manner, except that in the case of mechanically capping the ingot with a heavy cast iron cap, a rising steel is desired and the small aluminum additions are so regulated. Capping is also accomplished by addition of a strong deoxidizer such as aluminum or ferrosilicon (90 per cent silicon contained) to the extreme top of the ingot, the thoroughly deoxidized top portion serving as a cap to prohibit evolution of gas. A mold with a restricted bottle shaped top is used for capped ingots. Semikilled steels receive deoxidation in both ladle and mold, the final mold addition being varied to produce the soundest possible ingot. Sound killed steels are completely dexodized in the converter or ladle by use of various types of deoxidizers. Steels of this type are often teemed into open top molds equipped with a refractory hot top which, through its relatively greater insulation against heat loss,



MIXER POURING TO IRON LADLE



CHARGING OF MIXER FROM IRON LADLE CAR

maintains a molten condition in the extreme top of the ingot for a prolonged interval. Metalloid segregrates, occluded gases, and the cavity resulting from ingot shrinkage are thus confined to this portion, the remainder being relatively sound and free from chemical segregation.

Treated blown metal is also used in the production of steel castings. In this case, since the teeming operation may be of greater duration, and a greater degree of metal fluidity is required, the heat is blown to a higher temperature.

Since the range of blown metal temperatures necessary for satisfactory ingot teeming or open hearth duplex operation is restricted to relatively narrow limits, temperature control of the bessemer blow is a major problem. Principal sources of heat are the physical temperature of the molten iron as charged to the converter, and the oxidation of silicon during the blow. Oxidation of the other metalloids and iron itself also provide heat. Blowing temperatures may be affected by variations in the degree of heat loss to the converter itself, delays in handling iron as blown metal, and many other operational factors. Although uniformity of iron analysis, physical temperature of the charge, and converter operation is a constant objective, sufficient variation occurs necessitating some additional adjustment during the blow. Temperature is judged during the blow by brilliance of the flame issuing from the converter mouth, since, naturally, the hotter the metal the hotter the gases generated in it, and the hotter this gas when it reaches the air the greater the temperature and brilliance of the flame. In case of excessive temperature, coolant additions can be made or steam added to the blast. Amount of coolant addition is determined before the blow begins, and this depends to a great extent upon the performance of a previous blow from the same cast of blast furnace iron. Steel scrap and pig iron reduce temperature by the amount of heat required to melt the addition. Iron oxide bearing materials such as scale, ore, or spittings and similar converter scrap have a greater cooling effect since the heat consumed by the endothermic reaction of the reduction of iron oxide is added to that consumed in melting the material. Use of some quantity of coolants is deemed desirable since the converter offers a convenient means of reclaiming these materials.

Bessemer Steel

If additional reduction of temperature is required, steam may be injected into the blast at will. Dissociation of steam into its component gases, hydrogen and oxygen, consumes heat which is absorbed from the metal bath.

When blowing temperatures are too low, side blowing is used. In this procedure, the converter is tilted from its vertical position to an extent sufficient to expose one or more of the tuyeres above the molten bath. In this manner, oxygen in the blast is made available within the converter for combination with the carbon monoxide being evolved, and heat resulting from this chemical reaction is absorbed by the bath rather than the atmosphere at the converter mouth, thereby increasing bath temperature.

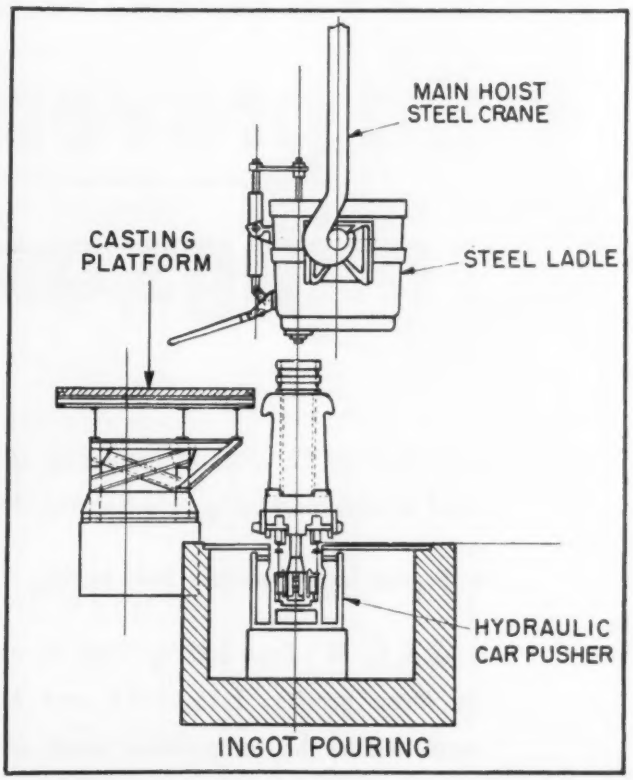
Degree of oxidation of the bessemer blow is determined almost entirely by the volume of air permitted to pass through the bath after the end point, when metalloid oxidation has ceased. Oxidation is minimized to achieve the greatest possible recovery of alloying additions such as ferromanganese, which is promptly oxidized by any oxygen remaining in the metal at the time of addition. However, some oxidation of the bath does occur even if the converter is turned down at the end point, since blast cannot be shut off until converter is in a horizontal position. In the production of nondeoxidized capped or rimming steels, some additional metal oxidation is necessary to attain a proper effervescent condition of metal in the ingot molds. In achieving the degree of oxidation required for the grade of steel being produced, the operator must consider several variables. Number of tuyeres open to deliver air, blast pressure and volume, metal temperature, amount of blown metal or bath depth and residual content of metalloids such as silicon or manganese which may protect the bath from oxidation are all known to vary and must be considered in establishing the duration of overblowing or blowing past the end point.

Control of the bessemer blow has depended to a large extent upon skill of the individual operator in his estimation of blowing temperatures, endpoints, and other characteristics of the blow which affect product quality. Numerous variables associated with the process itself, in addition to known differences in human beings' judgment based on visual observation, have resulted in a search for some active assistance to the blower in the form of scientific instruments. Sampling and analysis of metal and evolved gases, analysis of the flame by spectroscopic methods, pyrometric determination of flame temperatures, regulation of the quantity and analysis of the blast, and various other methods have been applied to the problem of control. Some of these methods proved to be too complicated and involved to be used in production, too slow to be adapted to a process as rapid as the bessemer, or did not provide records to allow scientific comparison and subsequent improvements. Two devices, a spectroscope which reflects chemical change in the bessemer bath as evidenced by the flame and is used in endpoint detection, and photoelectric cells, have been found useful.

The bessemer process may be said to have gone through several stages of development. The first interval came shortly after its introduction in "the eighteen fifties" and consisted of a period of intensive scientific investigation with all facilities available at that time. Second period was one of industrial expansion under the great steel masters. During this stage steelmaking efforts were directed toward producing more steel at a lower cost, and technical interest was at a low ebb. The last period can be defined roughly as the last 25 years, when scientific interest has again assumed major proportions in the steel industry.

In this day of scientific control of technical processes, where the operating man has the active assistance of instruments and technologists, the bessemer process stands out as an anomaly. Here control depends on just one man—the blower. There are available to him various devices for control, such as steaming, scrapping, side blowing, or regulating the blast. Blowers' ideas as to the proper way to control a blow vary widely from one man to another. In addition, the human eye varies from person to person, and is affected by fatigue and physical condition of the individual. Furthermore, the eye produces no permanent record of what has taken place. These factors have been largely overcome by development of a device employing the use of a photoelectric cell, commonly known as an electric eye.

The active element for picking up radiation of a bessemer flame is a group of three vacuum tubes. These are mounted in a housing and set up so that their field of view includes the whole flame. The unit is installed about 60 feet from the converter; exact location being controlled by conditions in the mill, such as possible interference by cranes, and



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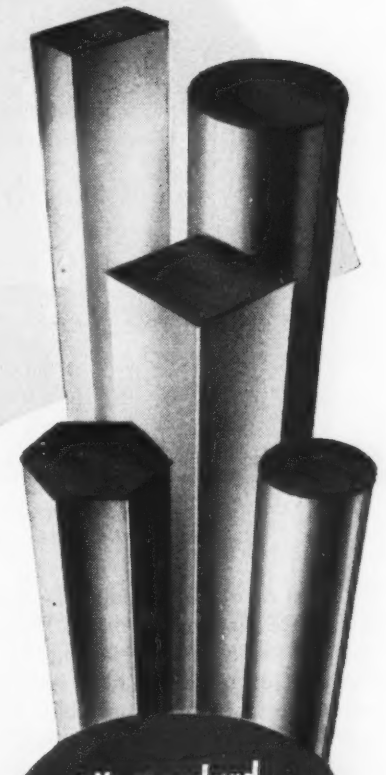

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Bessemer Steel

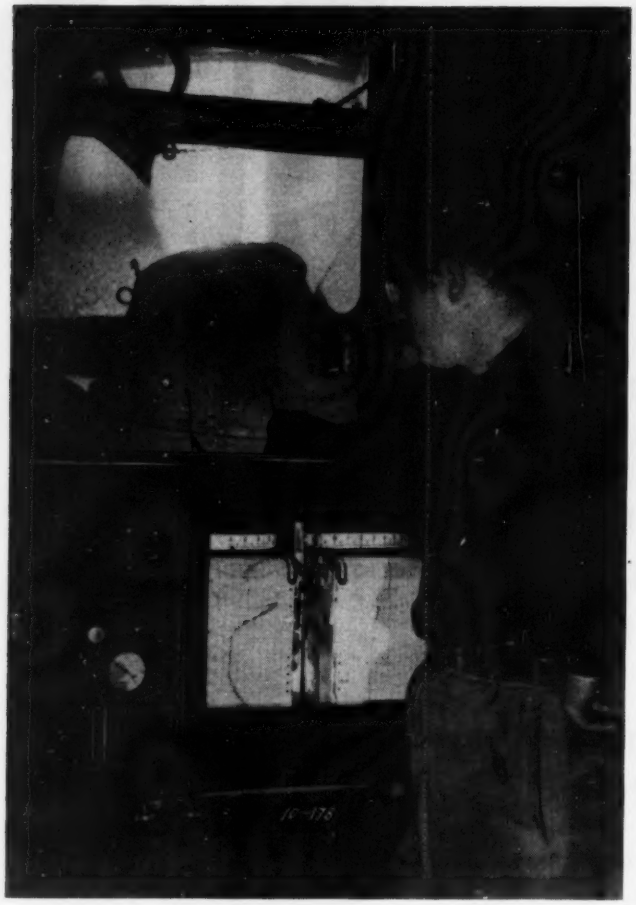

Fig. 14—Master electric eye instrument installed for use on a bessemer converter

exclusion of other bessemer flames, sun and sky from the field of view. Response of the cells is amplified and recorded on a chart, making available a permanent record of each blow. Chart records can be studied to determine the best possible blowing conditions—something that could not be done when flame changes were merely recorded in the memory of one man.

"Duplex", as used in the United States, refers to the metallurgical technique of combining partial refining of pig iron in an acid bessemer with final processing in a basic open-hearth furnace. Bessemer blown metal in the molten state is transferred to an open-hearth furnace and constitutes the major portion of the metallic charge. The proportion of pig iron is limited to the amount required to refine the heat properly.

Rapid expansion of open-hearth capacity during the early part of the present century caused an increased rate of scrap consumption with a resultant increase in scrap prices and decrease in the amount of scrap available. Attention was directed toward steelmaking methods that would reduce the proportion of scrap necessary for open-hearth operation. The obvious advantage of an acid bessemer converter for desiliconizing pig iron led to substitution of blown metal for the major portion of hot metal in the open-hearth charge, resulting in duplex process. Similar development had taken place in Europe about 1890.

In the bessemer steel process, carbon is usually oxidized until only a small amount, not over 0.10 per cent, remains. For duplex practice, it is sometimes advantageous to terminate the blowing operation while carbon is still comparatively high, occasionally as high as 2.0 per cent. Continuous production of high carbon metal causes formation of siliceous deposits on the converter lining, so in order to avoid maintenance difficulties a considerable portion of duplex metal is blown to the range of 0.10 to 0.20 per cent carbon.

In the early days of duplex operation the charge was considerably in excess of the size of the heat tapped; for example, a large tilting furnace might carry a 300-ton bath, from which two 100-ton heats would be tapped, leaving a 100-ton pool remaining in the furnace. Sufficient fluxes and blown metal would then be charged to again make a 300-ton bath. This resulted in a lack of metallurgical flexibility, and the practice now is to charge and work each heat individually.

Working of a duplex heat does not differ in principle from the working of a scrap and hot metal heat, but total refining period in the duplex process is comparatively short. No true lime boil occurs; formation of slag results essentially from melting and solution of the fluxes, and is accelerated by initial temperature of the charge as well as by presence of slag from the previous heat.

A high degree of metallurgical uniformity may be obtained by the duplex process. Desiliconized blown metal that makes up a substantial part of the molten charge minimizes undesirable effects produced by wide fluctuations in silicon content of blast furnace iron. Less alloy contamination is found in duplex steels than in steel made by the conventional scrap and hot metal practice. With increasing production of alloy steels in this country, percentages of residual alloys in plain carbon steels produced by the scrap and hot metal processes are gradually increasing. Reasonable attention to type and quantity of foreign scrap charged into the blast furnace insures comparative freedom from such contamination in duplex operation. Residual copper, usually troublesome in scrap and hot metal practice, seldom exceeds 0.02 per cent in duplex steel.

Bessemer steelmaking in Europe is fundamentally the same as in this country, except that basic linings are used almost exclusively. High phosphorus ores are not practicably workable in the acid process, and existence of large supplies of high phosphorus ores in Europe necessitates basic practice. European bessemer iron contains about 1.80 to 3.00 per cent phosphorus. Silicon is purposely kept low because high silicon iron would rapidly erode vessel lining, but at the same time the heat producing energy of silicon is sacrificed. Therefore high phosphorus iron is necessary for successful operation, as extra heat produced through oxidation of phosphorus compensates for heat lost through the small amount of silicon to be oxidized.

The basic process eliminates nearly all the carbon, manganese, and silicon, as in the acid process, and, in addition, most of the phosphorus and part of the sulphur. After silicon, manganese, and carbon are removed an end point is reached, lime is added and

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Vice President in charge of Engineering and Research,
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Structural members like the jack truss shown in the photographs are shop fabricated from wide flange beams and from plate. Component members are first positioned accurately for close fit-up and tack welded. One side is then partially welded with fillets of ¼" "Fleetweld 7" electrode using 500-amp. Lincoln "Fleetwelder" AC arc welders.

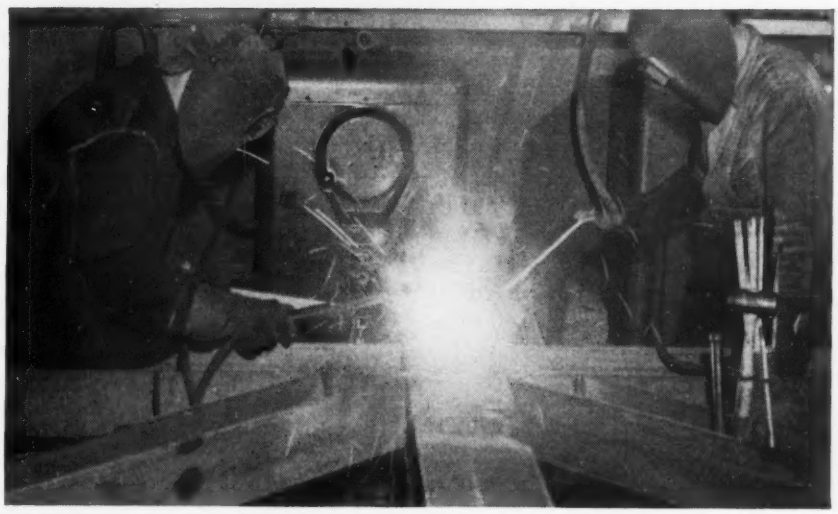

Fig. 1. *Arc welding diagonals to chord with the 500-amp. Lincoln "Fleetwelder" AC welders at the structural fabrication shop of The Austin Company.*

After the initial side welds are made, the truss is placed in an upright position as shown in Fig. 2 and continuous welds completed around each member, framing into the lower chord. The truss is then flopped over and similar welding is done for the members framing into the other chord. This procedure permits us to use fast downhand welding techniques on all connections and assures us solid, high quality welds on all joints at the lowest fabricating cost.

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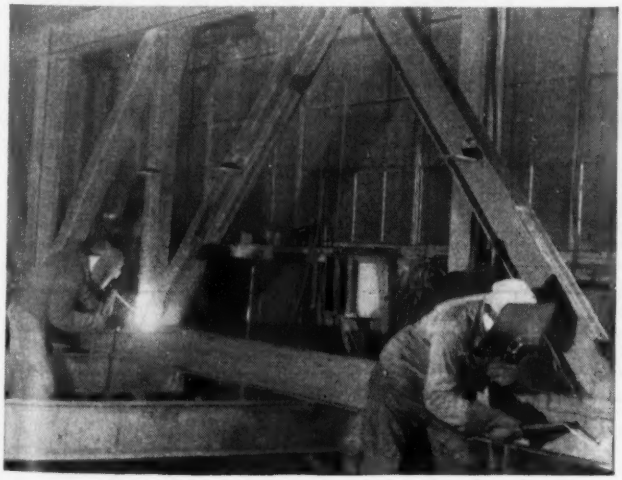

Fig. 2. *Fabricating* ***all-welded*** *40-ft. jack truss for factory building framework. Top and bottom chords are 10"-21WF beams; diagonals are 8"-17WF beams. Welds are downhand, single pass, ⅜" fillets.*

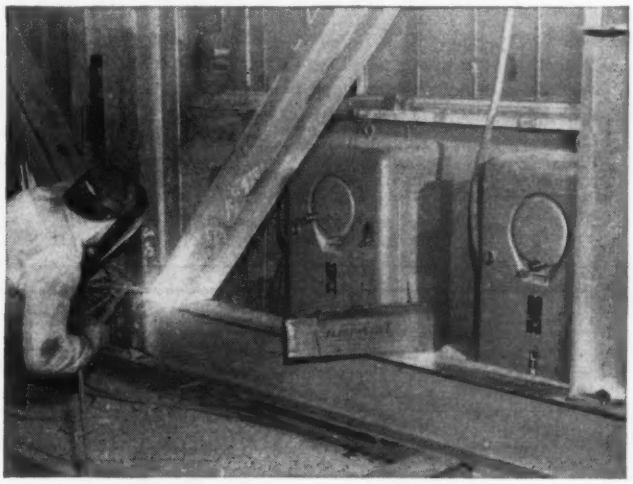

Fig. 3. *Finishing* ***all-around*** *welding of diagonal to bottom chord. Weld is made with single pass ¼" diameter "Fleetweld 7" electrode. Welding current is 310 amps.*

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the dephosphorizing afterblow begins and usually lasts about 5 minutes or more. Slag formed by the basic process is an important by-product rich in phosphate, and is used extensively for agricultural fertilizer.

On the continent the bessemer method of steelmaking is known as the Thomas process, and sometimes the Thomas-Gilchrist process, because of early experimental work done with basic converters by S. G. Thomas, aided to some extent by P. C. Gilchrist.

Basic lining for Thomas converters is made from burnt dolomite grains coated with tar, rammed in place with pneumatic hammers. Converters range in capacity from 20 tons in some of the older plants to 60 tons in the Hermann Goering Works in Germany.

During the wartime period in Germany, considerable work was done toward the production of low nitrogen Thomas steel. A method that proved quite successful was to half-blow a normal charge, then add enough ore to create a vigorous boil, and resume blowing until the end point was reached, which was usually 1 to 2 minutes short of normal. Nitrogens under 0.010 per cent were consistently obtained, compared with about 0.017 per cent for regular practice.

Most European plants rely entirely upon the blower's visual inspection of the flame. However, in England there have been developments in recent years to correlate the end point with disappearance of certain spectrum bands, and to predict temperature and bath composition during the blow. German metallurgists have had considerable success with experiments on spectrographic control of the blow. They found it possible to tip the converter at the desired phosphorus content, and to determine manganese content of the melt with an accuracy of about 0.08 per cent, provided that pig iron used always had the same manganese content.

In Russia, experiments have been conducted with a photocell element, used to measure flame radiation, as an aid in determining the end point. Russian scientists have also developed an apparatus called a "logoscope", with which attempts have been made to control carbon content in the finished blow.

One mechanical device which has been employed more than any other in European plants is the "bioptix", a built-in optical pyrometer which indicates when scrap should be added, by signaling when the flame is hottest.

The bessemer process has been a long-term contributor to the steel industry. For almost a century the glow of bessemer converters has indicated the course in a rapidly expanding business. It was the leading method of steel manufacture from 1870 to 1910, when it relinquished first place to the open-hearth process.

In the early days it would have been difficult for the steel industry to have entered rapidly upon a large tonnage production with any equipment other than a bessemer converter plant, largely independent as it is of steel scrap supply. The process uses little scrap, about 5 to 15 per cent of the metallic charge, where the open hearth ordinarily uses some 40 to 60 per cent. It is more than self-sufficient on scrap and produces scrap as a by-product. The open hearth constantly uses more scrap than it produces and this deficit must be supplied by trade scrap originating from previously manufactured steel articles. Only a very small tonnage of steel, or even wrought iron, was manufactured in the decade or two previous to 1880 and the volume of trade scrap available for steelmaking was insignificant. Introduction of the bessemer process was therefore very largely responsible for the rapidity with which the industry could advance. In 1886, steel production in the United States was 245,250 tons of open hearth and 2,541,493 tons of bessemer ingots. If it had been necessary

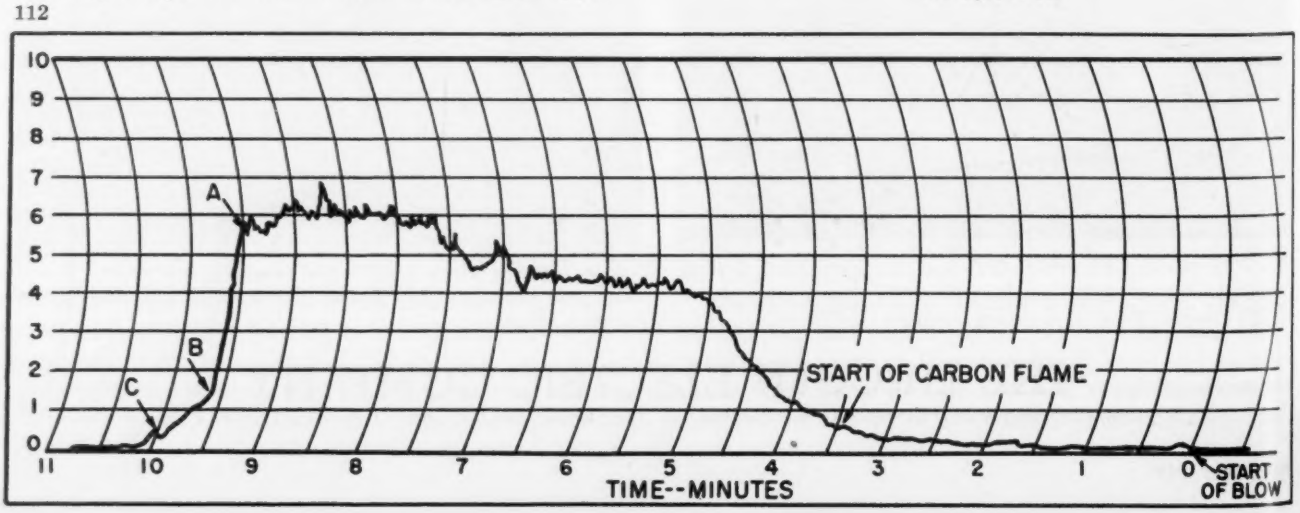
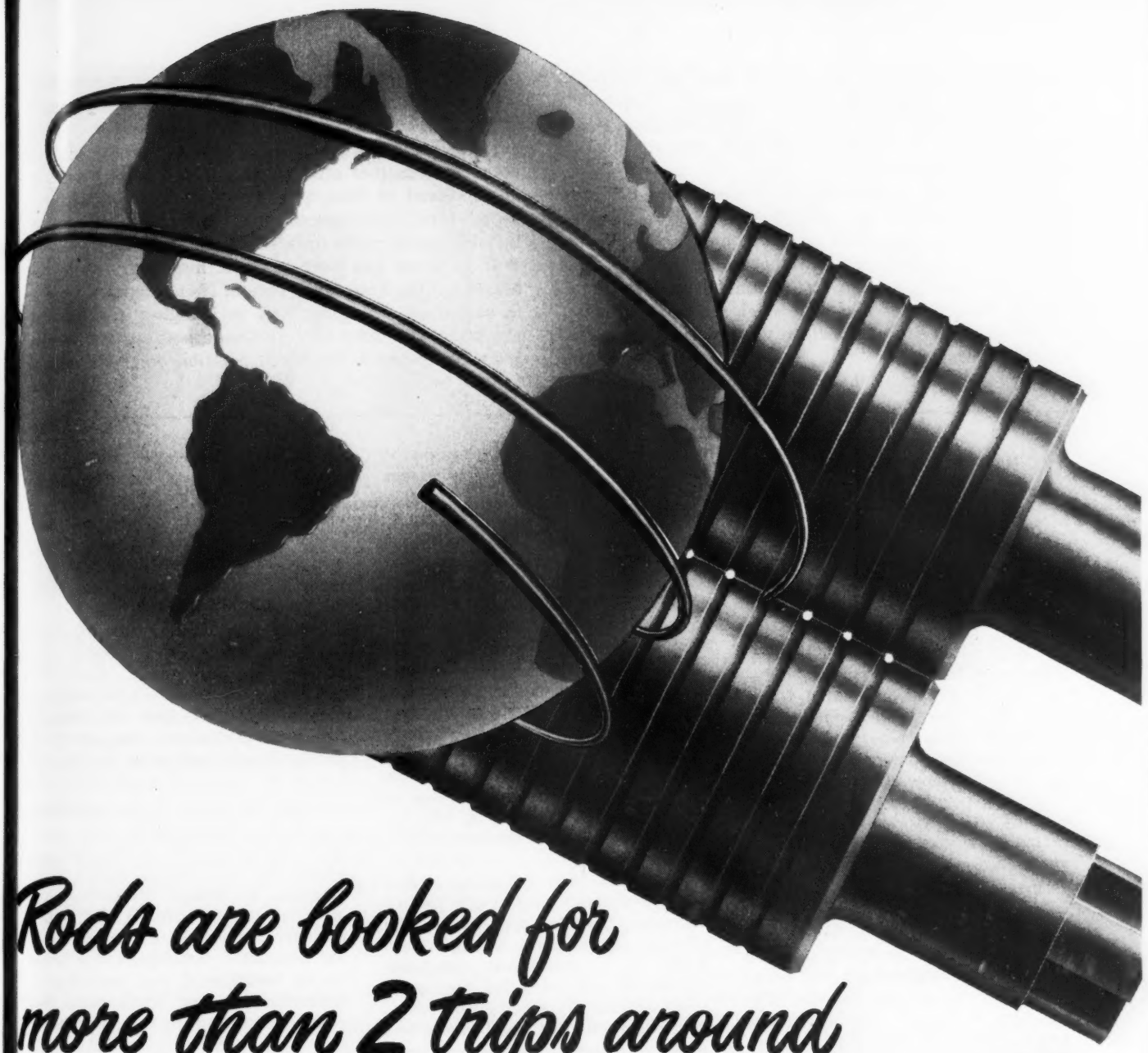


Fig. 15—Record of luminous energy of a bessemer blow as seen by the electric eye. Chart record, reading from right to left, shows that energy of the flame is low during oxidation of silicon but increases to a high level during carbon oxidation. When carbon is reduced to about 0.15 per cent at point A, flame intensity drops quickly to point B where at about 0.04 per cent carbon there occurs a slight retardation in rate of decrease of flame energy. Change at point B is a critical moment in the end of the blow and B is an important datum point on "electric eye" charts. As the vessel is turned downward into a horizontal position it reaches a point where the steel bath drops below the bottom tuyeres and the unimpeded flame impinges on the shield in front of the converter, producing a "flashback" which registers on the chart at point C. At this point all normal blowing action ceases. Portion of the blow between points B and C is known as the afterblow



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to make this 2,786,743 tons by the open hearth process with a 60 per cent scrap charge, the assembly of such an amount of scrap at that stage of the industry's history would have been a difficult, if not impossible undertaking.

Steel tonnage continued to increase more or less steadily to 1929; and even bessemer tonnage increased, or at least held its own, until 1920. With this constantly increasing tonnage, more and more scrap was available, to the ultimate disadvantage of the production of bessemer steel, since such ready availability of scrap obviously favored the open hearth process.

After World War I bessemer production began to decline in actual tonnage as well as in percentage of total steel production. Management, operating men, and metallurgists neglected the process for years; but just before World War II new attention was devoted to bessemer steelmaking, and in this period it has received at least a moderate amount of that research and development effort which has been so lavishly given to the open hearth process. Since World War II there has been a great increase in this research on the bessemer process. If this research work is continued, it cannot fail in bringing results and the industry's first large tonnage process may make its way toward a recovered position of great importance.

Technical Highlights

(*Continued from Page* 96)

peratures by using radioactive silver atoms as tracers. From these data, reported by Richard A. Nickerson, graduate student in physical metallurgy and Earl R. Parker, associate professor of metallurgy, University of California, Berkeley, the activation energy for the self-surface diffusion of silver was calculated to be about 10,300 calories per gram, atomic weight. This value was reported to be less than one-quarter of that for the self-volume-diffusion of silver, which is reported to be about 46,000 calories. The experiments were conducted in a vacuum of 10^{-6} mm of mercury.

Distribution of the radioactive silver was determined by a Geiger counter after exposures at various temperatures for controlled periods of time. The Geiger tube was located outside the vacuum chamber. The radiation measured were beta rays which escaped through a thin aluminum window in the vacuum chamber.

Revealing Grain Structures — Actual grain structures of the common alloys of aluminum in any condition now can be revealed for metallographic study, according to L. J. Barker, metallographer, Permanente Metals Co., Trentwood, Wash. The technique utilizes the bi-refringent qualities of electrolytically produced anodic films and requires polarized light for examination. Photomicrography is possible through the use of filters.

This development will increase the value of metallographic techniques in furthering the understanding and control of metallurgical principles involved in the fabrication of nonheat treatable aluminum alloys, Mr. Barker related.

By lightly anodizing metallographic specimens in an aqueous solution of fluoboric acid, it is possible to clearly reveal the grain structure of all the common alloys of aluminum regardless of temper or condition, it was brought out. This development provides the means to accurately study and photograph exact grain sizes, true grain structures or shapes, metal tempers, recrystallization phenomena and orientation effects.

Need for New Tests—Arthur S. Pedrick, assistant engineer of tests, Southern Pacific Co. of San Francisco, in speaking before a Society for Non-Destructive Testing session, noted that diesel-electric locomotives now coming into general use, have given rise to use of Magnaglo and Zyglo inspection methods. Gamma ray inspection work with radium in connection with cast-special test applications also is being used by the railroad, he stated.

Magnaflux and Magnaglo test methods function on the principle of magnetic particle build-up at the flaws due to magnetic leakage fields. Zyglo is a fluorescent penetrant method of nondestructive testing of surface flaws. It is being used mainly for inspection of diesel valves and roller retainers from the axle bearings.

Southern Pacific is using radium salts mainly in connection with foundry work and the checking of purchased castings for internal flaws. The short wavelengths of gamma-rays, which emit from the radium, penetrate the casting materials and darken a photographic film which is placed on the opposite side of the object.

Role of Metallography—Defined as the study of the constitution and internal structure of metals and alloys, metallography has played a major role in development of new alloys essential to modern industry, according to R. A. Bossert, metallographer, Aluminum Co. of America, Vernon, Calif. In the aluminum industry it has assisted in establishment of constitution diagrams of various alloy systems and in development of high strength alloys and their thermal treatments.

Results of metallographic examination depend largely on the careful selection of specimens and their proper preparation by polishing and etching, he pointed out. Proper interpretation of the results is necessary. Too often an attempt is made to draw unjustified conclusions from microscopic examinations.

Selection and preparation of specimens for metallographic examination are of prime importance. Many disappointing results have been obtained by improper selection of samples, Mr. Bossert related. The specimen should be representative of the defect or the metal in question.

Opens New Field — Microhardness testing, a comparatively new technique, opens another field to the engineer and metallurgist, stated V. E. Lysaght, of Wilson Mechanical Instrument Co. Inc., New York. When properly applied, he continued, it is an invaluable instrument for measuring hardness of thin, superficially hardened materials, small parts and edges of cutting tools. Microhardness tests might be classified as follows: Small precision parts, surface layers, thin materials and small wires, exploration of small areas, hardness of constituents, tool steels and the tips of cutting tools.

The most serious handicap for microhardness testing is the necessity of properly prepared samples, Mr. Lysaght noted. They must be lapped plane and free from scratches, and so mounted or supported that the indenter is normal to the testing surface. It was also said that the lighter the testing load the more highly polished surface is necessary.

In making any hardness test, the surface of the specimen should be flat and representative of sound metal unless the test is being made to determine surface conditions. According to the speaker, it is often necessary to file, grind or cut the surface, and such operations may change the hardness. The specimen should be of sufficient thickness so that no bulge or other markings appear on

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the surface opposite the indentation.

Magnesium Stature Grows — The desire for higher structural performance, for given or lighter weight than possible with the heavier structural metals, has directed interest to the light metals, particularly magnesium, according to George H. Found, manager, engineering and development department, Magnesium Division, Dow Chemical Co., Midland, Mich. Both substitution designs and original designs in the light metals must be perfected in the shortest possible time without the benefit of years of evolutionary experience he said. Dynamic loading problems have become more dominant in determining the adequacy of designs and materials.

Demands to continually improve the service performance of both commercial and military components while cost and weight are reduced always have confronted designers and fabricators, said the speaker. Concern for the efficient selection and use of material is necessary for making this progress. These include limitations imposed by fabrication operations, how well the mechanical properties of materials are understood and can be matched against requirements of service performance, and to what extent redundant material can be detected and removed.

Vibration in Impact Machinery Isolated

Extensive field tests on isolating vibration from all classes of impact machinery, especially forging hammers and drop hammers, have been completed by Korfund Co. of Long Island City, N. Y., working with Girard Associates, Chambersburg, Pa. Results are said to indicate that all hammer vibration can be successfully isolated at the hammer with no loss in forging effectiveness from the hammer blow.

It is pointed out that other machines and equipment can be entirely isolated from the vibrations and shocks set up by hammers already installed on conventional timber and concrete foundations wherever such negative isolation proves more desirable. It is the opinion of the Girard organization, forge and press plant engineers, that ability to locate hammers without concern for their vibration will greatly increase both the scope and effectiveness of hammer utilization. Full vibration isolation will also make for more effective plant layout by permitting logical integration of forging operations with other phases of tooling and finishing operations.

Enduring Precision

This spindle bearing is standard equipment on large spindles designed by a world-famous builder of precision grinders. For extreme accuracy, for freedom from vibration, and for enduring precision, only sleeve bearings will do. Where other types of bearing retain their accuracy only for months, Bunting Spindle Bearings endure for years. Where other complex types require a surgical standard of cleanliness and a watchmaker's skill for replacement, the Bunting Sleeve Bearing requires only common-sense and the services of a good mechanic.

The secret of this performance and long life lies in the film type of lubrication. A properly designed and well lubricated sleeve bearing need not acknowledge any superior. No other bearing type possesses its simplicity, its ruggedness, its ability to deliver accurate work for many years. These attributes are possessed by the sleeve bearing.

Bunting engineers are at your service whether your problem is a precision grinder spindle, an aircraft engine, an automobile engine, or something of more or of less exacting requirements. Bunting engineers utilize their extensive experience with bearings of all types in their work of designing Bunting Cast Bronze Sleeve Bearings. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

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NEED FOR STANDARDIZATION

Emphasized at Metal Powder Meeting

Powder metallurgy industry becoming of age . . . Part tolerances figured on knowledge of controlling variables . . . Industry's job is one of educational or missionary selling

FOLLOWING a phenomenal growth in a short span of years, influenced to a marked extent by World War II, powder metallurgy is enduring the postwar test of competition with other processes of metal fabrication. For the first time since the industry assumed major stature, it is finding time to catch its breath and is taking the opportunity for self-examination to make sure that its foundation is solid and that its products have the merit heretofore accorded them.

Evidence of this self-examination was found in proceedings of the Metal Powder Association, which on Apr. 5-6 held its fifth annual meeting and exhibit at the Drake Hotel, Chicago. Several speakers devoted their remarks to various phases of this problem, among these being utilization, standards and tolerances, and merchandizing of parts made from metal powders. Indicative of the interest in these matters, the meeting attendance of nearly 300 executives and technicians was a new high.

The convention program embraced an informal open discussion of powder metallurgy, two technical sessions with seven papers, and a luncheon.

As reported in STEEL, April 11, p. 59, B. T. duPont, sales manager, Plastic Metals Division, National Radiator Co., Johnstown, Pa. was elected president of the association; T. L. Robinson, president, Wel-Met Co., Kent, O., was named vice president; and Virgil T. Price, vice president and manager, Pyron Corp., Niagara Falls, N. Y., was made chairman of the board. In addition, two new directors were elected: W. P. Schenck, superintendent, Scrub Oaks Division, Alan Wood Steel Co., Conshohocken, Pa.; and F. F. White, vice president, S. K. Wellman Co., Cleveland. Holding over as directors are: M. A. Hunter, Federal-Mogul Corp., Detroit; T. R. Moore, Antara Products Division, General Aniline & Film Corp., New York; and G. H. Tulley, Metals Refining Co., Hammond, Ind. Robert L. Ziegfeld, 420 Lexington Ave., New York, continues as acting secretary.

In calling the convention to order, President Hall pointed out that the association and the industry is trying to do a good job with its product and is making serious effort to discount exaggerated and misconceived claims for structural parts made from powder metals. Tying closely into this theme was an address, "Tolerances of Finished Metal Powder Parts," by W. R. Toeplitz, vice president, Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

Often a Delusion—Structural parts produced by powder metallurgy are glamorous, Mr. Toeplitz stated. Through publicity in the powder metallurgy field many prospective customers are led to believe that by simply switching to powder metals structural parts with extremely close tolerances will be obtained at great savings in cost. He opined that this is a delusion in many instances.

Dimensional tolerances placed on drawings of a part by a designer are usually based on long experience with materials and processes together with data from handbooks and manufacturers' literature, continued Mr. Toeplitz. A designer doesn't call for tolerances of 0.001-inch on a sand casting nor does he think he must allow 1/64-inch on parts turned out in screw machines. It may be safely assumed that the designer bears in mind the economics of the part and will not specify closer tolerances than are actually required by the application or limits which would be extremely costly to produce by a given method.

Mr. Toeplitz showed a number of slides of drawings for structural parts made from metal powders. These showed the tolerances specified and along with them tolerances actually found in parts taken from production runs of several manufacturers. In some instances the variations amounted up to several hundred per cent.

Variables Control Tolerances—Also shown were additional slides listing innumerable variables in the processes of compacting, sintering and coining; in tool and die making; and in press equipment which operates against maintenance of extremely close tolerances. The chance of having all variables operate in the same direction are slight—rather, the variations tend to cancel out to favor maintenance of reasonable tolerances. The answer to the matter of tolerances, the speaker asserted, is in experience and knowledge of how to control variables. It is possible to predict what tolerances are practical, he stated.

The speaker summed up suggestions on the problem of tolerances as follows: 1. More work should be done on standardization of dimensional tolerances; this would be difficult on odd-shaped parts, but he believed many basic standards could be agreed upon. 2. Tell customers what dimensional concessions are required in advance. 3. If a concession on a dimension cannot be granted by a customer, figure that necessary corrective operation in the price beforehand. 4. Do not fear telling a customer that all of the answers are not known and that experimental work or a test run may be necessary to determine what can be done in any instance.

In his address on, "Selling Parts Made from Metal Powders", Morris Boorky, president, Presmet Corp., Worcester, Mass., pointed out that only twice in the lifetime of the average business man has he experienced that economic phenomenon known as a "sellers" market—during the two world wars. So far as the powder metal industry is concerned, he stated, it might properly be said it has never experienced a "sellers" market. The industry offers a unique, and still largely unappreciated technique of manufacture. The job will continue to be a laborious one of educational or missionary selling.

Can Produce Better Product—What the industry offers to customers, the speaker said, must enable them either to produce a better or lower-cost product. Within relatively well-defined limitations, it is known that industry can be offered a better or equally good product at a lower cost, Mr. Boorky said, but despite the nearly 30 years this industry has been in existence, ignorance, distrust and disinterest in the minds of a great number of purchasing and engineering men are encountered.

Requisite which he believed to be

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of prime importance is that the salesman representing powder metallurgical firms must have a sound knowledge of the fundamentals of powder metal fabrication. He must be well versed in all the phases which are encompassed in the fabrication of parts, the raw materials used, design and its limitations, tool design, the presses, tonnages required for pressing of various parts, sintering furnaces and atmospheres used, the speaker told the meeting.

Of equal importance, Mr. Boorky continued, are the secondary operations of repressing, coining and the machinability of parts thus made. This salesman should be well acquainted with the properties attainable, and the unique characteristics that this method of fabrication has to offer as well as the shortcomings of parts manufactured by the powder metal process.

In his presentation, the salesman should endeavor to point out the background of powder metallurgy, the raw materials and the equipment used and the process which we must undergo to fabricate a part by the powder metal method. In this manner, will be dispelled some of the "black magic," which invariably creeps into a new method or processes of manufacture when little is known about it, the speaker contended.

Occasionally a part designed for another method of manufacture lends itself to powder metal fabrication with little or no change. As this is the exception rather than the rule, he stated, an endeavor should be made to educate the design engineer as to the whys and wherefors of powder metal designs.

Definite Limitations—It was pointed out by Mr. Boorky that the design engineer must understand that powder metallurgy has definite limitations; paramount are those of design, strength and ductility. If the engineer is not educated in these limitations much time and energy is usually lost in going back and forth, until the part in question lends itself to successful fabrication and develops satisfactory properties. According to the speaker, the design engineer should not form his conclusions and recommendations by comparing the mechanical properties of powder metal with those of rolled or cast metal.

Unfortunately, those engaged in powder metal fabrication have not as yet developed uniform specifications, it was pointed out. Bearing specifications have been developed, he noted, but none are available for the field of structural parts. The porous nature of parts pressed from metal powders produces in them qualities which are unique and valuable, but which are not indicated by tensile and hardness values. In the speakers opinion, it should be illustrated to the prospective buyer that many intricate shapes requiring costly secondary operations now produced by the more conventional methods, can be produced at a low cost by the powder metallurgy process.

In closing his presentation, Mr. Boorky placed emphasis on the methods which are to be used in the inspection of these parts after fabrication. The lack of a standard inspection procedure is the result of the powder metal industry not having standard specifications. He stated that the policy at Presmet Corp. is to supply the potential user with a slug of the particular alloy which was chosen for the job. He is to make a sample part and conduct an actual test run. It is at this point an effort is made to reach an understanding with the customer as to the exact method which will be used by the inspection department prior to its acceptance of the pieces.

For Small Structural Parts—In a comprehensive paper entitled "Powder Metallurgy from the Design Engineer's Viewpoint", J. L. Bonanno, chief engineer, Lionel Corp., Irvington, N. J., pointed out that while powder metallurgy is not a panacea for all design engineers' troubles, it is peculiarly well suited to the fabrication of many small structural parts produced in large quantities. In his paper, which was a review of one of the latest and most extensive applications of powder metallurgy, the speaker illustrated how Lionel Corp. had made an almost complete change-over from die casting, machining and stamping production methods to powder metalurgy methods wherever possible in the manufacture of its model electric trains.

Prior to powder metallurgy, he stated, Lionel made its locomotive wheels by first die casting a zinc alloy wheel and then pressing on a steel tire cut from tubing. This method required several operations and involved considerable scrap losses. Now such wheels are made in one operation from iron powder at less than 60 per cent of the cost of the zinc alloy alone. All of the other car wheels formerly made by other processes are now made in one operation by powder metallurgy, the result being much less expensive wheels possessing greater mechanical advantage. Powder metallurgy may well be called the "scrapless" method, stated Mr. Bonanno.

Among the latest applications of metal powder in the unique "magnetic fluid clutch," and described by H. D. Saunderson, National Bureau of Standards, Washington, who is engaged currently in development of this new invention. In his paper, the speaker discussed characteristics of the materials involved in the clutch and factors which governed selection of the metallic powder.

Magnetic Flux Clutch—The clutch consists essentially of two plates, the space between them being filled with a magnetic liquid whose physical characteristics are controlled by application of magnetic flux. The liquid consists of three major ingredients, namely, a powder that can be magnetized—iron carbonyl powder was found to be most successful; an oil or other vehicle to carry the powder; and an additive to keep the powder particles in suspension.

Mr. Saunderson related that the magnetic fluid is useful in a number of devices in addition to the clutch, these including dash pots, hydraulic valves, shock absorbers, and as a molding material. The Bureau of Standards had a display in the exhibit, showing working models demonstrating the unique principles and applications of magnetic fluid.

"Some Effects of Oxygen on the Performance of Iron Powder" was discussed by J. J. Cordiano, Buel Metals Co., Painesville, O. Pointing out that iron, like most metals, usually is produced by conversion of the oxides, the speaker mentioned that standards have been set up to govern the allowable quantities of oxides in the iron powder since the oxides are detrimental. Reporting on preliminary research conducted recently, Mr Cordiano concluded that green density of iron powder varies directly with oxide content, also that these oxides when present internally in a compacted and sintered product do not materially affect the mechanical strength.

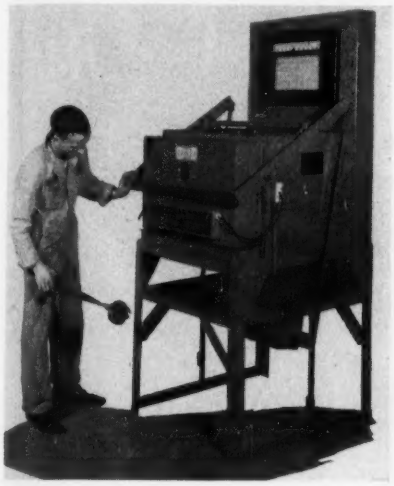
In a highly technical presentation, Dr. F. V. Lenel, Rensselaer Polytechnic Institute, Troy, N. Y., discussed effects of impurities in metal powders.

Health hazards which may exist in powder metallurgy were discussed by D. R. Johns, M. D., medical consultant, Metals Refining Co., Hammond, Ind., and other companies. "Safety first," he said, has been the cry for 40 years and has paid good dividends, but it was only 20 years ago that study of dust hazards and silicosis was undertaken. After dealing specifically with dust and fume hazards of different metals, Dr. Johns emphasized that as a precaution every company working with toxic metals should follow a prophylactic program.

New Products and Equipment

Box Furnaces

Heating element in the new series of industrial box furnaces offered by Cooley Electric Mfg. Corp., 38 South Shelby St., Indianapolis 7, Ind., have the resistors embedded in ceramic slabs. In the side walls they are so placed that an air space is left behind, above and below the slab which then forms a baffle wall, creating a



natural convection when heated. This not only equalizes the furnace temperature, but causes cool operation of the element and furnace wall.

Furnace door completely covers the operating end of the furnace and actually insulates the front section equally with the other furnace walls. The vertically operated door mechanism consists of a counterweighed yoke which pivots on antifriction bearings. Two types of fully automatic controls are available. Three furnace models are supplied in three sizes with maximum heating temperatures of 1850° F.

Check No. 1 on Reply Card for more Details

Automatic Lathe

Hydraulically operated and electrically controlled, the high production automatic lathe made by Morey Machinery Co. Inc., 4-57 26th Ave., New York 2, N. Y., is available in two types —model DB for between center work, and model CD for chucking and fixture work. Rigidity and close support of the cutting tools assure vibration-free turning, even on eccentric forgings and make possible use tungsten-carbide tools. A large variety of tooling arrangements and great flexibility is accomplished by a combination of the various types of standard rear slides and front carriages available.

Two speed ranges with automatic speed change during the automatic work cycle make the machine suitable for the facing and turning operations of flanged work pieces in one chucking. Correct cutting speed from the largest to the smallest diameter is maintained. Pushbutton controls are provided for all functions. Machine is completely self-contained, including hydraulic system, electric controls and cutting lubricant system.

Check No. 2 on Reply Card for more Details

Carbide Tool Grinder

Carbide tools may be ground either wet or dry with the model WD-10 tool grinder, developed by Hammond Machinery Builders Inc., Kalamazoo, Mich. The 10 x 19-inch table of the machine is equipped with a removable steel wear plate and table slot in

which the compound protractor tool gage slides. Table has openings to allow for coolant drainage. Quick adjustment of the table from any angle from 15 degrees above to 30 degrees below horizontal is possible.

Safety cup disk completely fills the open cup of the wheel and prevents injuries or dropping of tools into the cup of wheels. No spray-no splash guards permit unrestricted vision but keep operator and floor dry. Models are offered with two cup wheels or one cup and one straight wheel.

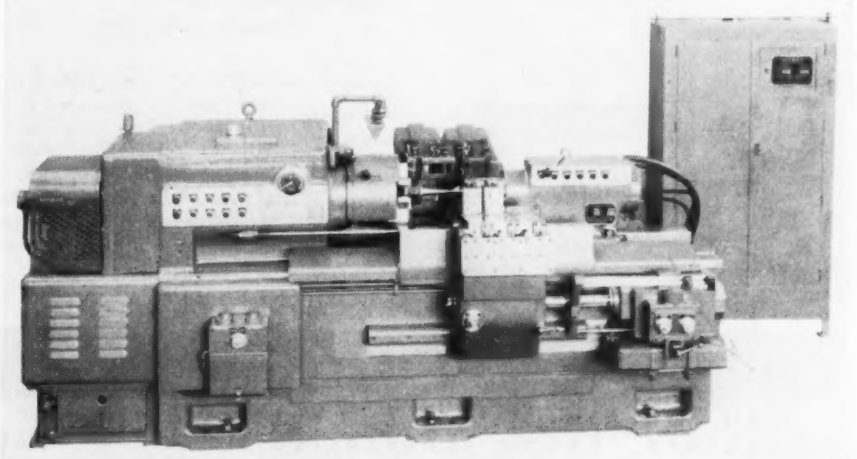
Check No. 3 on Reply Card for more Details

Power Wheelbarrow

Improvements on the Moto-Bug power-wheelbarrow, manufactured by Kwik-Mix Co., Port Washington, Wis., include equipping it with an optional 4-foot stake platform body that

is easily interchangeable with the 10-cu ft capacity hopper body, an optional riding step for the operator and a dual wheel placed on the direct steering mechanism. Adding the flat-bed platform gives the machine a 1200 pound capacity for handling loose loads, skids and bins. The platform may be tilted for unloading certain types of heavy material.

In connecting the steering hand lever to a dual rear wheel, a differential action is achieved for more ease in guiding and spotting. The machine is powered by a standard 4 hp gasoline engine and runs at speeds from 1½ to 4 mph in forward and reverse directions. A 33-inch width allows it



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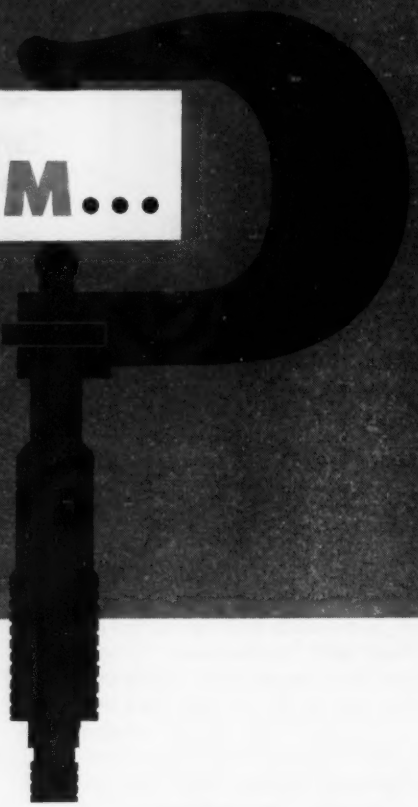
finishes?

drawing properties?

tolerances?

KHP ALUMINUM...

surface appearance?



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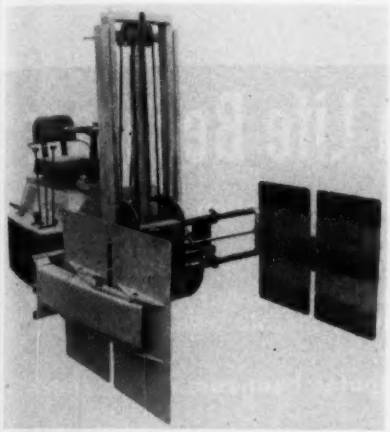
to clear doorways, narrow aisles and will allow it to turn in its own length.

Check No. 4 on Reply Card for more Details

Truck Clamping Device

Hyster Co., Portland 8, Oreg., is offering as an attachment for its lift trucks a carton clamp for handling goods in paperboard cartons. It is an attachment which squeeze-grips its load with enough side pressure to lift it without the need of pallets. Tines



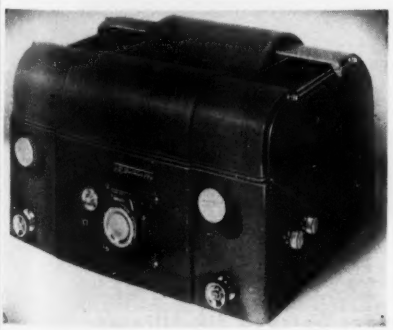
of the clamp may be opened to a maximum spread of 59 inches and closed to a minimum of 14 inches.

Abrasive strips on the metal plates prevent slipping of the load. The device is designed for efficient handling of 1700 pounds with the Hyster model 20 lift truck.

Check No. 5 on Reply Card for more Details

Wet Surfacer

Buehler Ltd., 165 W. Wacker Drive, Chicago 1, Ill., is manufacturing a No. 1251 Duo-Belt wet surfacer, for the cool hand grinding of standard tools or small production parts. It is driven by two belts si-



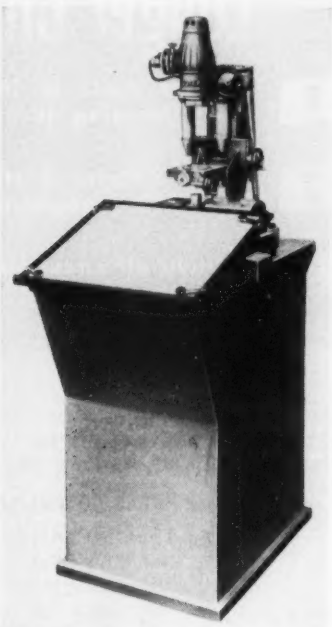
multaneously at either 1600 or 3200 fpm. Belts are cloth backed silicon carbide with grits from 80 to 600.

Coolant is furnished each belt independently and uniformly by a valve controlled spray head. Recirculating cooling system has a series of slow motion, spill-over type settling tanks. There is a uniformly flat removal of metal due to lack of formation of "flow" metal from local hot spots. Loading tendency of belt is minimized by the liquid wash.

Check No. 6 on Reply Card for more Details

Profile Projector

By twisting the turret lenses of the profile projector offered by Hauser Machine Tool Corp., Manhasset, N. Y., representative of Henri Hauser Ltd. of Switzerland, the desired magnification snaps into position without the interchanging of parts for magnification or illumination. The magnification slide also snaps auto-



matically into place in perfect alignment with the turret lenses. Condensers are built in a condenser head and correct illumination is chosen by a single turn of this head. A suitable condenser is provided for each magnification.

Reading accuracy on the screen is approximately 0.004-0.008-inch, which at a magnification of 100X, corresponds to an error on the object of 0.00004-0.00008-inch. Projector is offered with objectives for magnification of 10, 20, 50 and 100, various lenses and filters and other accessories.

Check No. 7 on Reply Card for more Details

Surface Grinder

Hydraulically operated, the No. 35 surface grinder, built by Covel Mfg. Co., Benton Harbor, Mich., has a capacity of 8 x 24 inches. Any standard 8 x 24-inch electric or permanent magnet chuck may be used with the machine. It is a horizontal reciprocating table surface grinder, grinding with the periphery of the wheel. Capacity under a 12-inch diameter grinding wheel is 24 inches longitudinal, 8 inches transverse and 11 inches vertical. Longitudinal table travel is 27 inches and transverse table travel is 9 inches. Vertical travel of grinding wheel is 14 inches.

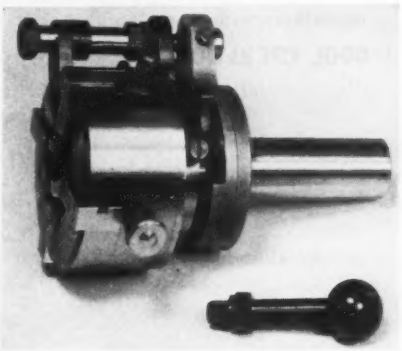
Table is provided with three 9/16-inch wide T-slots. The interchange-

able quill-type spindle has speeds of 1750, 2200 and 2600 rpm. The adjustable automatic hydraulic cross-feed for table is from 0.010 to 0.100-inch at each reversal of table. Table speed is from 10 to 90 fpm.

Check No. 8 on Reply Card for more Details

Aligning Shank Die Head

An aligning shank is built into the geometric style DS convertible opening die head, announced by Geometric Tool Co., Blake and Valley Sts., New Haven 15, Conn. This shank provides the means of quick centralizing of die head with work when machine misalignment exists. Correct alignment between work spindle



and die head chasers is essential in order to produce accurate screw threads.

Overall length of the new aligning head is practically the same as the standard style DS convertible die head and all other specifications are the same. Its use reduces overhang and maintains die head rigidity and initial machine capacity. Aligning

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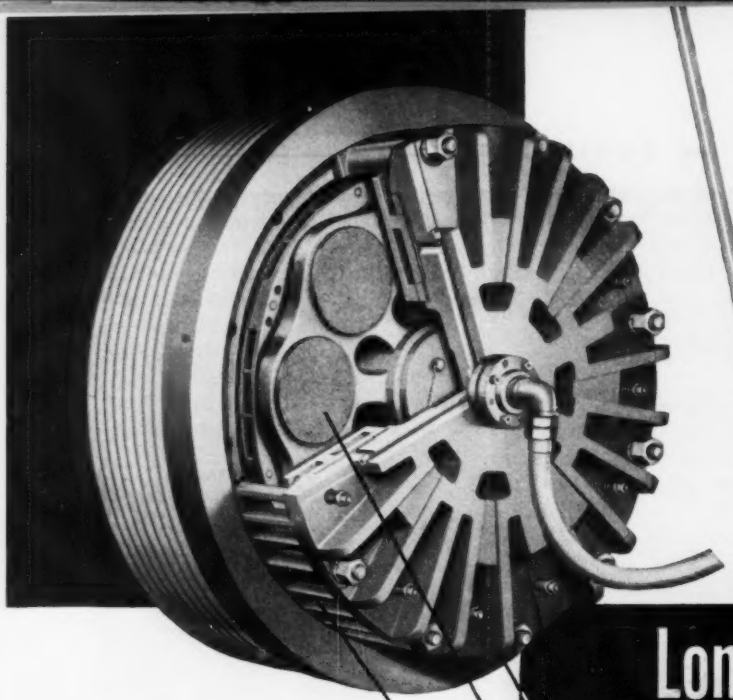

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2. Heavy circular friction discs last longer – more than 8,000,000 engagements with negligible wear under test.
3. Positive air circulation dissipates heat, cooling all clutch elements.

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Air-operated, the DANLY clutch responds instantly to convenient push button electrical controls. Low energy clutching is obtained with an exclusive design which requires starting only one-fifth of the mass that is subject to acceleration in conventional press clutches.

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Only the comparatively small weight of the drive shaft, the friction discs and retainer wheels are started and stopped in each press cycle. The greater mass, back-up plates, cylinder and piston, and clutch housing are in continuous rotation, actually increasing effective flywheel energy. This results in lower starting torque, more sensitive stop and go for repeated "inching" and single-stroking operations, with much less heat generated.

COOL OPERATION ASSURES LONG LIFE

Clutch maintenance usually comprises the largest share of press "down time" for repairs. Heat generated by the clutching action is the greatest cause of clutch failure. What heat is generated in the DANLY clutch is quickly dissipated by forced air circulation, before any undesirable temperature rise can occur. This cool operation contributes to long life of the friction discs and all non-metallic elements of the clutch. A centrifugal fan, built into the clutch housing, draws in a large volume of air. Air circulates through ample passages around all working parts.

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Thus, in DANLY mechanical presses, "down time" for clutch servicing is substantially reduced and long service life assured by advantages of the efficient DANLY friction clutch. Uninterrupted work means *more profitable press operation.*

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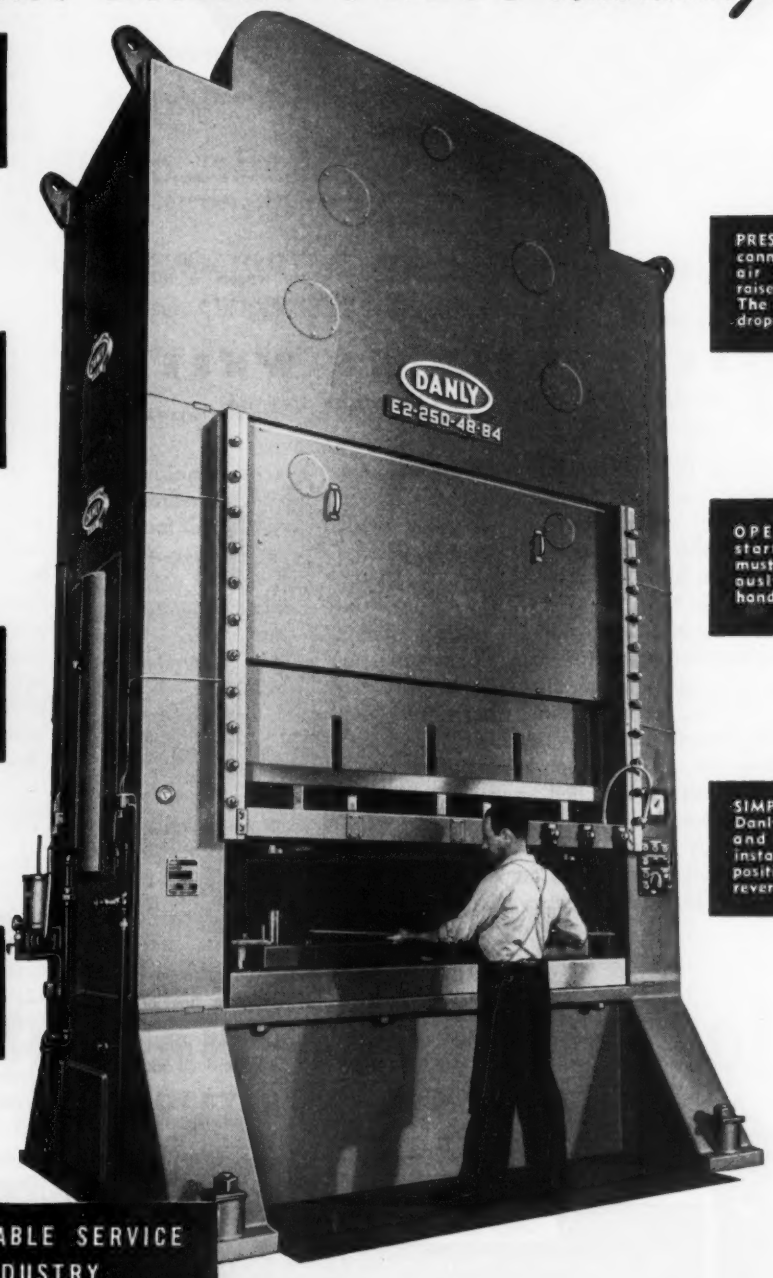
ALL-STEEL WELDED FRAME—With box-type uprights. Weldments are stress relieved for permanent alignment.

MASSIVE DESIGN—All members built to carry loads of rated press capacity. Extra rigidity maintains accurate die closure, even under heavy off-center loading.



PRESS SAFEGUARDS — Press cannot be operated until both air and oil pressures are raised to the required level. The press is stopped if either drops below the safety point.

OPERATOR SAFETY — To start press, "run" buttons must be pressed simultaneously, requiring operator's hands to be clear of the press.

SIMPLE CYCLE SELECTION—Danly controls are installed and press-tested to save installation time — include 5 position selector switch and reversing circuit.

25 YEARS OF DEPENDABLE SERVICE
TO THE STAMPING INDUSTRY

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- Seam welding wheels *make money* only when in use—*lose money* when idle for redressing.
- The difference between Weiger-Weed wheels and ordinary wheels is the less amount of dressing required.

In one of the nation's largest tube mills

SEAM WELDING WHEELS

were found by actual record to require dressing only once every three weeks.

The wheels they replaced needed dressing once a week, requiring 6 man hours, totaling 312 man hours a year. In the same period, redressing Weiger-Weed wheels made of the alloy properly engineered for the application added up to only 104 man hours, a saving of 208 man hours, or a full month!

And all this time, the Weiger-Weed wheels were in service—producing. This is only one instance, and the time saving would, of course, vary under different plant conditions. But, for your problem in seam welding or any other phase of resistance welding, the answer is in the *metallurgy* that goes into Weiger-Weed products. Seam welding wheels, dies, electrodes, replaceable tips are made from high strength, high conductivity alloys, developed by Weiger-Weed engineers for long life on production runs and minimum down time.

Weiger-Weed wheels are supplied to your specifications, either finished ready for use, or in rough form for you to finish. Several sizes of blanks are carried in stock. You are cordially invited to ask for Weiger-Weed service on any resistance welding problem—Weiger Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan.

For complete line of WW quality welding supplies and prices, ask for Bulletin 14.650

WEIGER-WEED TRADE MARK

11501-B

Resistance Welding ELECTRODES
DIES • TIPS • WHEELS • HOLDERS
DIVISION OF FANSTEEL METALLURGICAL CORPORATION

shank die head is available from stock up to and including ¾-inch size.

Check No. 9 on Reply Card for more Details

Air-Driven Pumps

Attaching quickly to a standard 55-gallon shipping drum, the number UC 240 constant flow underbody coating pump, built by Binks Mfg. Co., 3114 Carroll Ave., Chicago 12, Ill., handles materials of light or heavy

viscosity. Dual material pistons give surge-free delivery of material at a rate up to 5½-gallons per minute. Material is carried directly to the spray gun through a standard ¾-inch material hose. Material is delivered to the spray gun at 4 times the applied air pressure. A two-regulator control permits precise regulation of both material and atomizing pressure.

Check No. 10 on Reply Card for more Details

Vapor Degreaser

Automatic and requiring no attention during operation, a hot vapor stainless steel degreaser with automatic controls, made by Circo Products Co., 12117 Berea Rd., Cleveland 11, O., cleans and dries any metal before and after intermediate processing. Solvent is heated, creating clean, hot vapor, which penetrates greases and oils to the bare metal parts being degreased, where it condenses on the colder metal and continues to wash away the soil until the parts have been completely cleaned.

Degreasers are available in a number of standard sizes. Smallest unit is the electrically operated, automat-

INVESTIGATE
OXYGEN PRODUCTION
WITH
1949 MODEL SUPAIRCO PLANTS
LOWER PRICES
LOWER PRODUCTION COST LOWER MAINTENANCE COST

Backed by 20 years of leadership in this field

BUILT IN

High Pressure Type—Single Rectification; Capacities: 250 to 600 Cubic Feet per Hour.

High Pressure Type*—Double Rectification; Capacities: 750 to 3500 Cubic Feet per Hour.

Low Pressure Type*—Double Rectification; With Latest, Most Efficient Type, Oil Lubricated Expansion Engine; Capacities: 1000 to 7000 Cubic Feet per Hour.

*For Oxygen-Nitrogen Gas or Liquid Production.

SUPAIRCO Double Rectification Column, Equipped with Liquid Oxygen Pump. (Motor can be Mounted on Either Side of Pump)

Send for New, Illustrated Catalog

SUPERIOR AIR PRODUCTS CO.
128 MALVERN STREET • NEWARK 5, N. J., U. S. A.

Also manufacturers of Plants and Apparatus for Liquid Air, Acetylene and Containers and Flasks for Liquid Air, Oxygen and Nitrogen.

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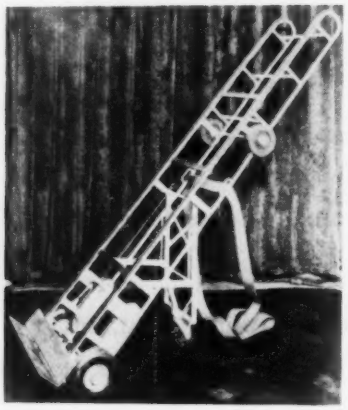
ically controlled Cub, which requires only 18 x 23 inches of floor space and stands 42½ inches high. Circo-Solv solvent, used in this unit, will degrease any and all metals and will not burn or explode.

Check No. 11 on Reply Card for more Details

Crawler Hand Truck

A rubber belt, running on rollers set in an aluminum frame, allows operation of Escort hand trucks on stairways, according to its manufacturer Stevens Truck Division, Associated Services, 224 W. Main St., Carlinville, Ill. On flat surfaces the truck rolls on two rubber tired wheels. Trucks are built with steel, aluminum or wooden frames and are avail-



able in a variety of models for different purposes.

One model has a swivel wheel which, when dropped into use, allows the unit to be rolled with no weight on the operator. Another has wheels at the handle end which are used when loading heavy equipment on to a truck. Wheels are placed on the bed of the truck and the ground end raised, rolling the load without lifting it. Truck capacities are from 500 to 1500 pounds.

Check No. 12 on Reply Card for more Details

Band Saws

With a planetary transmission providing infinite speeds in the saw speed range of from 70 to 500 fpm, the power band saw with spiral blade, built by Tyler Mfg. Co., 6151 W. 98th St., Los Angeles 45, Calif., will cut steel and other tough metals as well as wood, aluminum and other light materials. The operator has a choice of any speed within this range. Tough rubber-tired guide rollers hold the blade to the necessary rigid cutting line.

With a 360-degree cutting edge, the the blade cuts smoothly in any direction. This enables the operator to cut any pattern without turning the work. It also makes possible work on any material 24 inches wide and in infinite lengths as well as making possible working from either right or left hand side of the saw. Table tilts 45 degrees to the right and 5 degrees to the left. Saw is driven by a 1/3-hp, 110-v electric motor.

Check No. 13 on Reply Card for more Details

Adjustable Pallet Rack

Designed for storage of loaded pallets is a new type of adjustable pallet rack introduced by Rack Engineering Co., 925 Liberty Ave., Pittsburgh 22, Pa. Shelves of the rack are adjustable for any height load without the use of bolts or wrenches. Shelf is supported at four corners on the notched uprights and can be adjusted upward or downward by fork lift truck.

Base rack can easily be expanded in either direction through the use

of additional units consisting of one upright section and necessary cross braces bolted into place. Rack will handle any load capable of being palletized and is well suited for sheet metal or die storage. Units are constructed to handle standard size pallets.

Check No. 14 on Reply Card for more Details

Industrial Tractor

Full protection for tires on the wheels is provided by the new steering axle on the redesigned Clarkat industrial towing tractor, announced by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. Steering tread of the new axle is reduced to $22\frac{5}{16}$ inches from 27 inches, permitting the wheels to be turned to their extreme position within the body of the machine. On the new axle, the steering tie rods have been raised and a heavy steel plate 6 inches wide is mounted beneath the axle to protect the steering mechanism.

Incorporated in the steering mechanism is the universal joint which helps eliminate wheel kickback. Tractor is equipped with Innacush-type solid tires on all wheels. Pneumatic and solid tires are available as optional for rear drive wheels only. A new upholstered air-cushioned seat provides greater driver comfort.

Check No. 15 on Reply Card for more Details

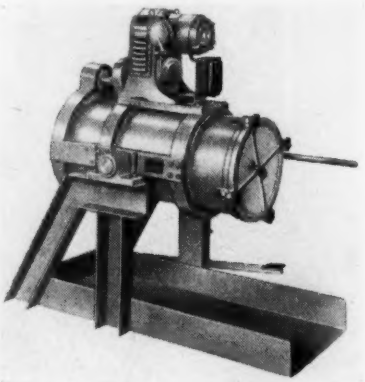
Crane Cab

A crane operator, when seated in a full-vision crane cab, made by Whiting Corp., Harvey, Ill., can, from his seated position in a restful armchair, have a lateral vision of two-thirds of a circle and can see almost straight down. The new style cab uses magnetic switching controls, which are space saving and mounted so as not to interfere with vision. All crane movement is governed by a slight pull or push on short, ball-tipped levers connected to low-voltage multipoint time-delay speed controls. Cab is weather proof and may be provided with air-conditioning, telephone communication and fluorescent lighting.

Check No. 16 on Reply Card for more Details

Burnishing Barrels

Burnishing barrels offered by Belke Mfg. Co., 947 N. Cicero Ave., Chicago 51, Ill., are equipped with variable speed drives. The drive is mounted on top of a barrel, where it is



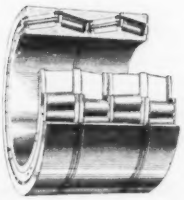
conveniently accessible for speed adjustment and at the same time stays dry and out of the way. Turning of a small hand crank adjusts rotating speed from 13 to 39 rpm. Other speed ranges based on a 1 to 3 or 1 to 4 ratio can be furnished.

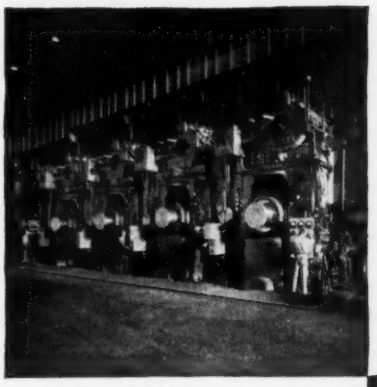
Barrels are balanced for easy tilting and a spring pressure ratchet lock, operated by a foot lever, holds the barrel at any angle. Its aluminum cover is light in weight and self-sealing. Barrels are offered in three sizes and with either hard maple or

Torrington Bearings help

set production records

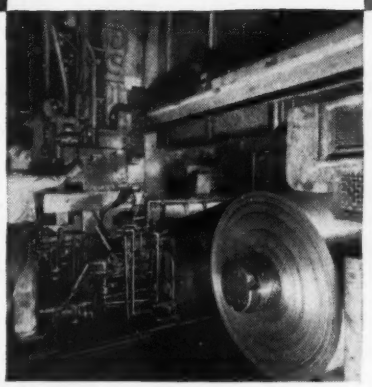
on World's Fastest Steel Rolling Mill





The Mesta-Built tandem cold strip mill, record setter for JONES & LAUGHLIN, is equipped with dependable Torrington 4-row Tapered Roller Bearings on work rolls to handle tremendous loads at high speed.

Mill Screw Downs, the fastest in response action ever installed in any five-stand tandem cold strip mill, put the pressure on back-up rolls through high-capacity, low-friction Torrington Thrust Bearings.



Torrington Radial and single and double-row Tapered Roller Bearings in the tension reel provide rigid support and smooth operation for coiling steel strip at high speeds.

More than 6,250 feet of steel strip a minute! That's the record set by the new tandem cold strip mill, the world's fastest, designed, built and erected for Jones & Laughlin by Mesta Machine Company.

To the work rolls, screw downs and take-up reel, Torrington Bearings – tapered, radial and thrust types – bring speedy response, greater rigidity and exceptional service life. They help keep the mill on the go with less maintenance attention.

If you want to set new production records, specify Torrington Bearings for your heavy-duty equipment. For engineering service from design to maintenance, contact our nearest office.

THE TORRINGTON COMPANY

South Bend 21, Ind. • Torrington, Conn.

District Offices and Distributors in Principal Cities

TORRINGTON TAPERED ROLLER **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

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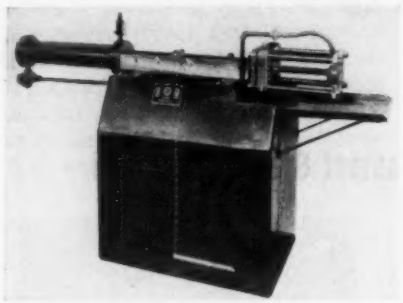
rubber lining and with steel ribs welded to the inside surfaces of the barrel.

Check No. 17 on Reply Card for more Details

Broaching Machine

An attachment for the standard 20-inch pull broaching machine, made by Zager Tool Inc., 23880 Lakeland Blvd., Cleveland 23, O., adapts it for push broaching of two holes at one time, maintaining both relationship and center hole spacing. The two broaches are fastened permanent-



ly into the ram of the fixture, which is in turn pushed by the ram rod of the broaching machine.

Part is located on the head end of the broaching fixture and the operation consists of pushing the broaches through and pulling them back out. The return stroke serves to release the part which in turn drops down into the tray. Use of a removable fixture makes the machine more versatile, as it can be applied to a large variety of work.

Check No. 18 on Reply Card for more Details

• • •

PIPE BURNERS: Engineered in three types for use with natural, manufactured or liquefied petroleum types of gas, a new line of pipe burners is announced by Bryant Industrial Division, Cleveland 10, O. They are equipped with Lojector venturi mixers, with or without gas cocks. Size range covers ⅜ to 4-inch pipe size with flame lengths from 60 to 132 inches.

Check No. 19 on Reply Card for more Details

IMPACT WRENCH: A new Thor ⅜-inch universal electric impact wrench is announced by Independent Pneumatic Tool Co., Aurora, Ill. It has a free speed, forward or reverse, of 2150 rpm, strikes 2000 blows per minute and operates on alternating-direct current, 60 cycles.

Check No. 20 on Reply Card for more Details

MAGNETIC CONTACTORS: Bulletin 4454 size 4 and 4455 size 5 alternating current magnetic contactors for motor, heater and lamp control purposes are announced by Ward Leonard Electric Co., Mount Vernon, N. Y. Size 4 contactors are available with a maximum of five main poles and size 5 units with two or three poles only.

Check No. 21 on Reply Card for more Details

COMPRESSOR: Designated as Little Workhorse, a 7 cfm lightweight compressor is offered by Davey Compressor Co., Kent, O. Unit consists of a V-type, two cylinder, single stage compressor direct connected to a 4½ hp aircooled engine. Compressor has a 2½-inch bore with 1¼-inch stroke and operates at 3000 rpm.

Check No. 22 on Reply Card for more Details

DRIVE: Furnished in ratings through ½-hp, the Thy-mo-trol drive available from General Electric's Control Division, Schenectady, N. Y., utilizes a simplified half-wave circuit to provide direct current flexibility from alternating current power.

Check No. 23 on Reply Card for more Details

ABRASIVE: Waltham Grinding Wheel Co., Waltham 54, Mass., has developed a new abrasive for use with resinoid bonded wheels when grinding cast iron and Meehanite. Type 16A is for surface removal over 6500 surface feet per minute and heavy duty C abrasive for 6500 surface feet per minute or less.

Check No. 24 on Reply Card for more Details

BRIGHTENER: Rohco 20 XL, an improved brightener for cadmium plating is offered by R. O. Hull & Co. Inc., Cleveland 13. It enables production of unusually brilliant cadmium plate directly from plating bath without a bright dip.

Check No. 25 on Reply Card for more Details

LOCKERS: Lyon Metal Products Inc., Aurora, Ill., offers steel-wood lockers with entire framework and doors of steel, all other parts are of steel reinforced Masonite.

Check No. 26 on Reply Card for more Details

WASHERS: Sealing washers offered by Franklin C. Wolfe Co., Beverly Hills, Calif., are for use around screws, bolts, rivets, tubing, electrical wire, etc. They are known as Lock O Seal.

Check No. 27 on Reply Card for more Details

SHUT-OFF VALVE: Improved models of Warden automatic low pressure shut-off valve incorporating a precision lapped synthetic rubber seat which provides positive closure are offered by Security Valve Co., Los Angeles, Calif. Recommended for use on gas or fluid lines where closure is desired when pressure fails from any cause, they are available in sizes ¾-inch through 8 inches.

Check No. 28 on Reply Card for more Details

WINDING DEVICE: A spring-winding device that will make either compression or extension springs from the smallest to 1-inch inside diameter, with the maximum wire size of ⅛-inch, is available from Crown Mfg. Co., St. Louis, Mo. Springs can be made with any desired pitch and any length.

Check No. 29 on Reply Card for more Details

COUPLING: A new Taper-Lock rigid coupling for connecting ends of two shafts is offered by Dodge Mfg. Co., Mishawaka, Ind. It is available in sizes up to and including 5 inches.

Check No. 30 on Reply Card for more Details

SELECTOR VALVE: The new electrically operated dual pressure selector valve offered by Saval Inc., Los Angeles 11, Calif., is designed specifically for water pressures to 7000 psi and may also be used on oil or air. It will accommodate screwed, welded or flanged connections up to 2 inches on pressure ports and 2½ inches on return port.

Check No. 31 on Reply Card for more Details

FLUXES: Victor Equipment Co., San Francisco 7, Calif., offers four new fluxes: No. 3 for brazing brass and bronze, steel, clean cast and malleable iron; No. 5 for moderate heat brazing of cast and malleable iron; No. 7 for high heat brazing of cast and malleable iron where base metal gets exceptionally hot; No. 9 for fast, effective welding of cast iron.

Check No. 32 on Reply Card for more Details

PROPANE CYLINDER: Harrisburg Steel Corp., Harrisburg, Pa., announces a high strength propane cylinder of 100 pound capacity. Designated as Lite-Weight, it can be supplied in any quantity desired, with or without pressed steel caps, with valve inserted if desired.

Check No. 33 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

SHAKEOUT of premium prices continues in the steel markets as competition for business mounts in step with receding mill order backlogs. For all practical purposes premiums have just about disappeared and freight absorption is being resumed here and there. Pressure from buyers now is increasingly exerted on standard price listings. These have held to date but with the scramble for orders on in earnest, retreat from present levels by some producers would not be surprising, especially should third quarter tonnage fail to develop in hoped-for volume.

PRICES—Last week a broad list of products was affected by various premium price reductions. Among them were hot and cold-rolled strip, hot-rolled annealed sheets, silicon sheets, carbon steel plates, and galvanized sheets and pipe. Further, some warehouse reductions were effected, reflecting slower demand and reduced costs resulting from ability to obtain steel closer to home marketing areas. The reduction in galvanized products was attributable to a cut in zinc, while downward adjustments on brass and copper products were in line with lower prices on both zinc and copper.

COMPOSITES— Undertone of the markets remains weak. STEEL's arithmetical price average on finished steel last week eased to $94.45 from $94.91 and compared with $81.14 for the like week a year ago. On steelmaking pig iron the composite dropped to $46.10 from $46.22 and compared with $39.18 a year ago. The steelmaking scrap composite declined to $23.42 from $24.08 and compared with $40.50 a year ago.

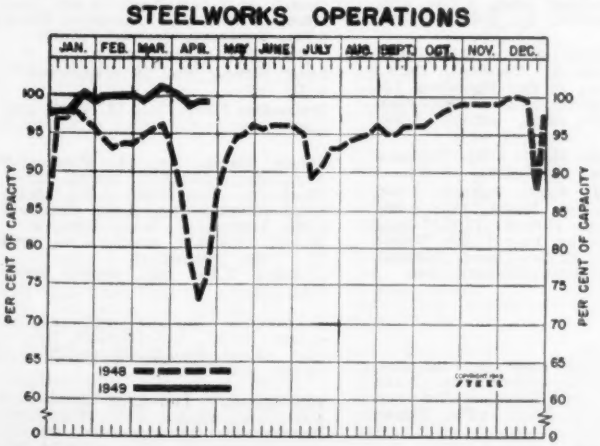
BOOKINGS—Steel mill order books are being opened for third quarter shipment. This is the earliest such action has been taken in several years and reflects the interest of sellers in building up order backlogs. Certain mills are not accepting tonnage for shipment beyond July, but they are the exception. As indicated by recent price reductions, the market situation is increasingly competitive, with supply fast coming into balance with demand.

DEMAND—For the most part consumers are ordering with extreme caution, watching price trends closely. Opening of books for third quarter has aroused little interest in future commitments. Buyers are working off inventories, still considered large in light of reduced manufacturing operations in various directions. Some order cancellations and cutbacks are coming to the mills resulting in spot openings in rolling schedules.

RAW MATERIALS— The scrap market continues demoralized with prices tending downward. No sign has yet appeared the bottom is near with the steel mills generally out of the market. Foundry demand is extremely sluggish. Steel mill scrap inventories are estimated to run from 30 to 60 days supply. At the same time, pig iron is in surplus supply and some curtailment in blast furnace operations has resulted with iron being stockpiled. Premium prices on pig iron have about faded out. Switch of some blast furnace capacity from production of merchant iron to steelmaking grade is expected on a substantial scale in event merchant demand does not pick up soon. The coke market also is showing signs of easiness with supplies noticeably improved.

PRODUCTION— Despite the sluggish demand and drop in steel order backlogs, the steel producers still have sufficient business on their books to support high level operations through the current quarter. What will happen in the last half of the year is uncertain but the steelmakers are confident a substantial volume of business will develop once consumer inventories are pretty well digested and the price outlook is clarified. Currently, major demand support appears to be coming from the automotive and related industries.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended April 23	Change	Same Week 1948	Same Week 1947
Pittsburgh	98.5	+ 0.5	80	101
Chicago	100	None*	85	96
Eastern Pa.	93	— 1	68	90.5
Youngstown	105	None	51	86
Wheeling	95.5	None	72	93.5
Cleveland	100.5	None	95.5	93
Buffalo	104	None	64	88.5
Birmingham	100	None	71	99
New England	80	— 8	80	95
Cincinnati	106	+ 2	52	85
St. Louis	84.5	None	85	92
Detroit	111	+ 1*	101	92
Western	97.5	— 4	..	..
Estimated national rate	99	None	75.5	95.5

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. * Revised.

MARKETS SUMMARY
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COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Apr. 23	Apr. 16	Month Ago Mar. 1949	Year Ago Apr. 1948	5 Years Ago Apr. 1944
Finished Steel	$94.45	$94.91	$97.17	$81.14	$56.73
Semifinished Steel	69.02	69.02	73.51	68.72	36.00
Steelmaking Pig Iron	46.10	46.22	46.22	39.21	23.00
Steelmaking Scrap	23.42	24.08	34.60	40.41	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Mar. 1949	4.04073c
Feb. 1949	4.06149c
Jan. 1949	4.05394c
Mar. 1948	3.63079c
Mar. 1944	2.42750c

*** STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods, on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

† FINISHED STEEL WEIGHTED COMPOSITE: Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. March, 1949, figure is preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

Finished Materials

	Apr. 23, 1949	Mar. 1949	Jan. 1949	Apr. 1948
Steel bars, Pittsburgh mills	3.35c	3.43c	3.45c	2.90c
Steel bars, del. Philadelphia	3.8164	3.8164	3.8094	3.356
Steel bars, Chicago mills	3.35	3.35	3.35	2.90
Shapes, Pittsburgh mills	3.25	3.27	3.275	2.80
Shapes, Chicago mills	3.25	3.25	3.25	2.80
Shapes, del. Philadelphia	3.4918	3.4918	3.4888	2.968
Plates, Pittsburgh mills	3.50	3.50	3.50	2.95
Plates, Chicago mills	3.40	3.40	3.40	2.95
Plates, del. Philadelphia	3.6348	3.7256	3.7217	3.19
Sheets, hot-rolled, Pittsburgh mills	3.25	3.275	3.275	2.80
Sheets, cold-rolled, Pittsburgh	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Pittsburgh	4.40	4.40	4.40	3.95
Sheets, hot-rolled, Gary mills	3.25	3.25	3.25	2.80
Sheets, cold-rolled, Gary mills	4.00	4.00	4.00	3.55
Sheets, No. 10 galv., Gary mills	4.40	4.40	4.40	3.95
Strip, hot-rolled, Pittsburgh mills	3.50	3.50	3.50	3.05
Strip, cold-rolled, Pittsburgh mills	4.375	4.375	4.375	3.80
Bright basic, wire, Pittsburgh	4.15	4.255	4.325	3.775
Wire nails, Pittsburgh mills	5.15	5.525	5.775	5.20
Tin plate, per base box, Pitts. dist.	$7.75†	$7.75†	$7.75†	$6.80

Semifinished

Sheet bars, mill	$67.00*	$67.00*	$67.00*	$60.00
Slabs, Chicago	52.00	52.00	52.00	45.00
Rerolling billets, Pittsburgh	52.00	56.20	59.00	45.00
Wire rod ⅜ to ¼-inch, Pitts. dist.	3.775c	3.775c	3.775c	3.175c

* Nominal. † 1.50 lb coating.

Pig Iron

	Apr. 23, 1949	Mar. 1949	Jan. 1949	Apr. 1948
Bessemer, del. Pittsburgh (N.&S. sides)	$48.08	$48.08	$48.08	$40.996
Basic, Valley	46.00	46.00	46.00	39.00
Basic, eastern, del. Philadelphia	49.39	50.3002	50.2676	42.004
No. 2 fdry., del. Pgh. (N.&S. sides)	47.58	47.58	47.58	40.496
No. 2 fdry., del. Philadelphia	49.89	50.8002	50.7676	42.504
No. 2 foundry, Chicago	46.25	46.25	46.25	39.00
No. 2 foundry, Valley	46.50	46.50	46.50	39.50
Southern No. 2 Birmingham	43.38	43.38	43.38	37.88
Southern No. 2 del. Cincinnati	49.43	49.43	49.09	41.857
Malleable, Valley	46.50	46.50	46.50	39.50
Malleable, Chicago	46.50	46.50	46.50	39.50
Charcoal, low phos., fob Lyles, Tenn.	66.00	66.00	66.00	55.00
Ferromanganese, f.o.b. Etna, Pa.	175.00	170.20	163.00	151.00*

* F.o.b. cars Pittsburgh.

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$25.00	$37.00	$41.90	$40.25
Heavy melt. steel, No. 2, E. Pa.	20.00	30.70	40.00	39.00
Heavy melt. steel, No. 1 Chicago	22.50	33.30	40.00	39.00
Heavy melt. steel, No. 1 Valley	22.00	35.85	39.75	40.25
Heavy melt. steel, No. 1 Cleveland	20.00	34.10	45.88	39.75
Heavy melt. steel, No. 1, Buffalo	23.50	35.95	45.88	43.00
Rails for rerolling, Chicago	31.00	43.85	59.38	49.50
No. 1 cast, Chicago	29.50	39.20	58.38	68.40

Coke

Connellsville, beehive furnace	$14.50	$14.50	$14.50	$12.55
Connellsville, beehive foundry	17.00	17.00	17.00	14.875
Chicago, oven foundry, ovens	20.40	20.40	20.40	19.25

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $80-$85 per gross ton. Forging quality, $50 per net ton, mill.

Alloy Steel Ingots: $51 per net ton, mill.

Rerolling Billets, Blooms, Slabs: $52 per net ton, mill, except: $57, Conshohocken, Pa.

Forging Quality Billets, Blooms, Slabs: $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

Alloy Billets, Slabs, Blooms: Rerolling quality, $63 per net ton, mill except: $65, Consohocken, Pa.

Sheet Bars: $67 nom., per net ton, mill; sales in open market $90 per gross ton.

Skelp: 3.25c per lb, mill.

Tube Rounds: $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

Wire Rods: Basic and acid open-hearth, 7/32 & ⅜-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O., Los Angeles; 4.15c Monessen, Pa. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

Bars

Hot-Rolled Carbon Bars (O.H. only; base 20 tons): 3.35c, mill, except: 3.55c, Ecorse, Mich.; 4.00c Fontana, Calif.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif.; Portland, Oreg., Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 4.40c, Atlanta.

Rail Steel Bars: (Base 10 tons): 3.35c Huntington, W. Va., and Moline, Ill.; 4.75c, Williamsport, Pa.

Hot-Rolled Alloy Bars: 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 4.75c, Fontana, Calif.

Cold-Finished Carbon Bars (Base 40,000 lb and over): 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.50c, Camden, N. J.; 5.30c, Los Angeles.

Cold-Finished Alloy Bars: 4.65c, mill, except: 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford, Conn.

High-Strength, Low-Alloy Bars: 5.10c, mill, except: 5.30c, Struthers, O.; 5.40c, Ecorse, Mich.

Reinforcing Bars (New Billet): 3.35c, mill, except: 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. **Fabricated:** To consumers: 4.25c, mill, except: 5.00c, Seattle.

Reinforcing Bars (Rail Steel): 4.65c, Williamsport, Pa., mill; 3.35c, Huntington, W. Va.

Wrought Iron Bars: Single Refined: 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa.; 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

Sheets

Hot-Rolled Sheets (18 gage and heavier): 3.25c, mill, except: 3.45c, Ecorse, Mich.; 3.75c, Conshohocken, Pa.; 3.95c, Pittsburg, Torrance, Calif.; 4.15c, Fontana, Calif.; 6.25c, Kansas City, Mo.

Hot-Rolled Sheets (19 gage and lighter, annealed): 4.15c, mill, except: 4.40c, Alabama City, Ala.; 5.05c, Torrance Calif., Kokomo, Ind.

Cold-Rolled Sheets: 4.00c, mill, except: 4.20c, Ecorse, Mich., Granite City, Ill.; 4.95c, Pittsburg, Calif.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) 4.40c, mill, except: 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

Galvannealed Sheets: 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.70c, Kokomo, Ind.

Culvert Sheets, No. 16 flat Copper Steel (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

Long Ternes, No. 10 (Commercial quality): 4.80c, mill.

Enameling Sheets, No. 12: 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.

Silicon Sheets, No. 24: Field: 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren. **Electrical: Hot-rolled,** 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O. **Motor:** 6.70c mill, except: 6.90c, Granite City, Ill.; 7.20c, Warren, O. **Dynamo:** 7.50c, mill, except: 7.70c, Granite City, Ill.

Transformer 72, 8.05c, mill; 65, 8.60c, mill, except: 10.60c, Brackenridge, Pa.; 58, 9.30c, mill, except: 11.30c, Brackenridge, Pa.; 52, 10.10c, mill.

High-Strength Low-Alloy Sheets: Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich. Galvanized (No. 10), 6.75c, mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich.

Strip

Hot-Rolled Strip: 3.25c mill, except: 3.30c, Cleveland, Pittsburgh; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich.; 3.60c, Detroit; 3.65c, Atlanta; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa, Colo.; 4.65c, Fontana, Calif. One company quotes 4.90c, Pittsburgh base.

* Wider than 6-in. and 6-in. and narrower, respectively.

Cold-Rolled Strip (0.25 carbon and less); 4.00c, mill, except: 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.15c, Riverdale, Ill.; 4.20c, Ecorse, Mich.; 4.40-4.50c, Detroit; 4.50c, New Haven, Conn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O.; New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los Angeles; 5.55c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

Cold-Finished Spring Steel: 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton and Harrison, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton and Harrison, N. J.

Cold-Rolled Alloy Strip: 9.50c, mill except: 9.80c, Worcester, Mass.

High-Strength, Low-Alloy Strip: Hot-rolled, 4.95c, mill, except: 5.15c, Struthers, O.; 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich., mill.

Tin, Terne Plate

Tin Plate: American Coke, per base box of 100 lb, 1.25 lb coating $7.50-$7.70; 1.50 lb coating $7.75-$7.95. Pittsburg, Calif., mill $8.25 and $8.50, respectively, for 1.25 and 1.50 lb coatings.

Electrolytic Tin Plate: Per base box of 100 lb, 0.25 lb tin, $6.45-$6.65; 0.50 lb tin, $6.70-$6.90; 0.75 lb tin, $7.00-$7.20.

Can Making Black Plate: Per base box of 100 lb, 55 to 128 lb basis weight $5.75-$5.85. Pittsburg, Calif., mill, $6.50.

Holloware Enameling Black Plate: 29-gage, 5.30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill.

Manufacturing Ternes (Special Coated): Per base box of 100 lb, $6.65, except: $6.75 Fairfield, Ala., Sparrows Point, Md.

Roofing Ternes: Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

Plates

Carbon Steel Plates: 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.50c, Coatesville, Pa.; 3.55c, Conshohocken, Pa.; 3.60c, Pittsburgh; 3.65c, Claymont, Del., Ecorse, Mich.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston; 5.30c, Fontana, Calif.; 4.95c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

Floor Plates: 4.55c, mill.

Open-Hearth Alloy Plates: 4.40c, mill, except: 4.50c, Coatesville, Pa., mill.

High-Strength, Low-Alloy Plates: 5.20c mill, except: 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.40c, Youngstown; 5.65c, Ecorse, Mich., Sharon, Pa.

Shapes

Structural Shapes: 3.25c, mill, except: 3.30c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 3.75c, Phoenixville, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 3.80c, Fontana, Calif.

Alloy Structural Shapes: 4.05c, mill.

Steel Sheet Piling: 4.05c, mill.

High-Strength, Low-Alloy Shapes: 4.95c, mill, except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 5.15c, Struthers, O.

Wire and Wire Products

Wire to Manufacturers (carloads): Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Minnequa, Colo., Atlanta, Buffalo; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco. One producer quotes 4.15c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Basic MB Spring Wire, 5.55c, mill, except: 5.65c, Sparrows Point, Md.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

Upholstery Spring Wire, 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa., Portsmouth, O.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

Wire Products to Trade (carloads): Merchant Quality Wire: Annealed (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 5.10c Worcester, Mass.; 5.15c, Minnequa, Colo.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 4.80c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Galvanized (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 5.40c, Aliquippa; 5.55c, Worcester, Mass.; 5.60c, Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburg, S. San Francisco, Calif. One producer quotes 5.25c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Nails and Staples: Standard, cement-coated and galvanized nails and polished and galvanized staples, Col. 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 109, Worcester, Mass.; 110, Minnequa, Colo., Atlanta, Cleveland; 123, Pittsburg, Calif. One producer quotes Col. 103, Chicago and Pittsburgh base; another, Col. 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Woven Fence (9 to 15½ Gage, inclusive): Col. 109, mill, except: 111, Portsmouth, O., Kokomo, Ind.; 116, Minnequa, Colo.; 121, Atlanta; 132, Pittsburg, Calif. One producer quotes Col. 109, Pittsburgh and Chicago base; another, Col. 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

Barbed Wire: Col. 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 126 Atlanta; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes Col. 123, Chicago and Pittsburgh base.

Fence Posts (with clamps): Col. 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

Bale Ties (single loop): Col. 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind., Portsmouth, O.; 110, Atlanta; 113, Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes Col. 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

Stainless Steels

(Mill prices, cents per pound)

CHROMIUM NICKEL STEELS

Type No.	Bars, Wire Shapes	Strip, Cold-Rolled	Sheets
301	28.50-28.75	30.50-32.00	37.50-40.75
302	28.50-28.75	33.00-33.75	37.50-40.75
303	31.00-31.50	36.50-39.75	39.50-43.00
304	30.00-31.25	35.00-35.75	39.50-43.00
316	46.00-48.00	55.00-57.25	53.00-57.25
321	34.00-34.75	44.50-45.75	45.50-49.00
347	38.50-39.75	48.50-50.25	50.00-54.00

STRAIGHT CHROMIUM STEELS

410	22.75-23.00	26.50-27.00	32.00-33.00
416	23.25-23.50	28.25-33.50	32.50-33.50
430	23.25-23.50	27.00-27.50	34.75-35.50
446	32.50-33.00	60.00-62.25	46.50-50.00

STAINLESS-CLAD STEELS

	Plates —Cladding— 10%	Plates —Cladding— 20%	Sheets —Cladding— 10%	Sheets —Cladding— 20%
302	....	....	19.75	21.50
304	22.50	26.50	20.75	22.50
310	32.50	36.50	....	....
316	27.00	31.00	26.00	28.00
321	23.50	27.50	....	....
347	25.00	29.00	24.00	26.00
405	18.75	24.75	....	....
410	18.25	24.25	....	....
430	18.25	24.25	....	....

Tool Steels

Tool Steel: Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

W	Cr	V	Mo	Co	Base Per lb
18	4	1	...	...	90.50c
18	4	2	...	...	102.50c
18	4	3	...	...	114.50c
18	4	2	...	9	168.50c
1.5	4	1	8.5	...	65.00c
6.4	4.5	1.9	5	...	69.50c
6	4	3	6	...	88.00c

Tubular Goods

Standard Steel Pipe: Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton. Discounts from base follow:

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Blk.	Gal.
⅛	39½–	10–	1	46–	26½–
	41½	11½		48½	30½
¼	37½–	11–	1¼	46½–	27–
	39½	13½		49	31
⅜	34–	6–	1½	47–	27½–
	36	8½		49½	31½
½	40½–	19½–	2	47½–	28–
	43	23½		50	32
¾	43½–	23½–	2½, 3	48–	28½–
	46	27½		50½	32½
			3½ & 4	44½	26

In.	Lap Weld Blk.	Lap Weld Gal.	Elec. Weld Blk.	Elec. Weld Gal.	Seamless Blk.	Seamless Gal.
2	40½	21	38½	18	28–	8½–
					38½	20
2½	44½	25	41½	21	33½–	14–
					41½	23
3	44½	25	41½	21	36–	16½–
					41½	23
3½&4	42½–	22–	43½	23	38½–	19–
	46½	27			43½	25
5 & 6	42½–	22–	43½	23	43½	23½–
	44½	26				25
7	....	....	....	....	43½	24

Line Steel Pipe: Mill prices in carlots to consumers about $200 a net ton.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Butt Weld Blk.	Butt Weld Gal.
⅛	40½	11½	1¼	46–	27½–
¼	38½	13½		48	30
⅜	35	8½	1½	46½–	28–
½	40–	20–		48½	30½
	42	22½	2	47–	28½–
¾	43–	24–		49	31
	45	26½	2½ & 3	47½–	29–
1	45½–	26–		49½	31½
	47½	29½	3½ & 4	43½	25

In.	Lap Weld Blk.	Lap Weld Gal.	Elec. Weld Blk.	Elec. Weld Gal.	Seamless Blk.	Seamless Gal.
2	39½	20	37½	17	27–	7½–
					37½	19
2½	43½	24	40½	21	32½–	13–
					40½	22
3	43½	24	40½	21	35–	15½–
					40½	22
3½–4	41½–	21½–	42½	22	37½–	18–
	45½	26			42½	24
5 & 6	41½–	21½–	42½	22	42½	22½–
	43½	25				24
8	45½	26	44½	23–	44½	23½–
				23½		25
10	45	25½	44	22½–	44	23–
				23		24½
12	44	24½	43	21½	43	22–
						23½

Standard Wrought Iron Pipe: Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

In.	Butt Weld Blk.	Butt Weld Gal.	In.	Lap Weld Blk.	Lap Weld Gal.
⅜	+59½	+92	1¼	+22	+49½
½	+20½	+49	1½	+15½	+42
¾	+10½	+38	2	+ 7½	+33
1 and			2½-3½	+ 5	+28½
1¼	+ 4½	+29	4	List	+22½
1½	— 1½	+25½	4½-8	+ 2	+24
2	— 2	+25	9-12	+12	+33½

Boiler Tubes: Net base c.l. prices, dollars per 100', mill; minimum wall thickness, cut lengths 4 to 24", inclusive.

O.D.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	.....	13.39-14.64	13.00	13.00
1¼	13	.....	15.87-17.34	13.21	15.39
1½	13	16.45	17.71-19.35	14.60	17.18
1¾	13	18.71	20.16-22.02	16.60	19.54
2	13	20.96	22.56-24.66	18.60	21.89
2¼	13	23.36	25.16-27.50	20.73	24.40
2¼	12	23.54-25.73	27.70-30.28	22.83	26.88
2½	12	25.79-28.19	30.33-33.15	25.02	29.41
2¾	12	27.33-29.87	32.14-35.13	26.51	31.18
3	12	28.68-31.35	33.76-36.90	27.82	32.74
3¼	11	33.39-36.50	39.29-42.95	32.39	38.11
3½	11	35.85-39.19	42.20-46.13	34.78	40.94
4	10	44.51-48.65	52.35-57.22	43.17	50.78
4½	9	58.99-64.47	69.42-75.88	....	....
5	9	68.28-74.64	80.35-87.82	....	....
6	7	104.82-114.57	123.33-134.81	....	....

Pipe Cast Iron: Class B, 6-in. and over, $98.50 per net ton, Birmingham; $106.70, del. Chicago; 4-in. pipe, $5 higher; Class A pipe, $5 a ton over Class B.

Rails, Supplies

Rails: Standard, over 60-lb; $3.20 per 100 lb mill, except: $3.30, Minnequa, Colo.

Light (billet): $3.55 per 100 lb, mill, except: $4.25, Minnequa, Colo.

Light (rail steel): $4.50 per 100 lb, Williamsport, Pa.; 3.55c, Huntington, W. Va.

Railroad Supplies: Track bolts, treated: $8.50 per 100 lb, mill. Untreated: $8.25, mill.

Tie Plates: 4.05c mill, except: 4.20c, Pittsburg, Torrance, Calif.; 4.50c, Seattle.

Splice Bars: 4.25c, mill.

Standard Spikes, 5.35c, mill.

Axles: 5.20c, mill.

UNIVERSITY OF MICHIGAN LIBRARIES

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., furnace	$48.00	$48.50	$49.00	$49.50
Newark, N. J., del.	50.5334	51.0334	51.5334	52.0334
Brooklyn, N. Y., del.	....	52.634	53.134	....
Birmingham, furnace	42.88	43.38	....	....
Cincinnati, del.	....	49.43	....	....
Buffalo, furnace	46.00	46.50	47.00	....
Boston, del.	55.20	55.70	56.20	....
Rochester, del.	48.35	48.85	49.35	....
Syracuse, del.	49.2065	49.7065	50.2065	....
§**Chicago,** district furnaces	46.00	46.00-46.50	46.50	47.00
Milwaukee, del.	47.82	47.82-48.32	48.32	48.82
Muskegon, Mich., del.	....	51.28-51.78	51.78	....
Cleveland, furnace	46.00	46.50	46.50	47.00
Akron, del.	48.3002	48.8002	48.8002	49.3002
Lone Star, Tex., furnace	46.00	†46.50	....	....
Gulf ports, del.	50.50	51.00	....	....
Duluth, furnace	....	46.50	46.50	47.00
Erie, Pa., furnace	46.00	46.50	46.50	47.00
Everett, Mass., furnace	....	52.50	53.00	....
Geneva, Utah, furnace	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	54.0578	....	....
Portland, Oreg., del.	....	54.0578	....	....
Los Angeles, San Francisco	53.5578	54.0578	....	....
Granite City, Ill., furnace	47.90	48.40	48.90	....
St. Louis, del.	49.40	49.90	50.40	....
Ironton, Utah, furnace	47.00	47.50	....	....
‡**Neville Island, Pa.,** furnace	46.00	46.50	46.50	47.00
Pittsburgh, del., N.&S. Sides	47.08	47.58	47.58	48.08
Pittsburgh (Carnegie), furnaces	46.00	....	....	47.00
Sharpsville, Pa., furnace	46.00	46.50	46.50	47.00
Steelton, Pa., furnace	48.00	48.50	49.00	49.50
Struthers, O., furnace	46.00	....	....	....
Swedeland, Pa., furnace	48.00	48.50	49.00	49.50
Philadelphia, del.	49.39	49.89	50.39	50.89
Toledo, O., furnace	46.00	46.50	46.50	47.00
Cincinnati, del.	50.8230	51.3230	....	....
Youngstown, O., furnace	46.00	46.50	46.50	47.00
Mapsfield, O., del.	50.1022	50.6022	50.6022	51.1022

† Low phosphorus southern grade.

‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaca; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.

§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) .$59.50
6.51-7.00.. 60.75 9.01- 9.50. 67.00
7.01-7.50.. 62.00 9.51-10.00. 68.25
7.51-8.00.. 63.25 10.01-10.50. 69.50
8.01-8.50.. 64.50 10.51-11.00. 70.75
8.51-9.00.. 65.75 11.01-11.50. 72.00

F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $78.50 furnace, Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Piglets, Si 16%, $91, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 a ton for 0.45% max. P.

Charcoal Pig Iron

Semi-cold blast, low phosphours. F.o.b. furnace, Lyles, Tenn....$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Low Phosphorus

Steelton, Pa., Troy, N. Y., $54; Philadelphia, $56.9786 del. Intermediate phosphorus, Central furnace, Cleveland, $51.

Electrodes

(Threaded, with nipples, unboxed)

Inches Diam.	Length	Cents per lb. f.o.b. plant
	Graphite	
17, 18, 20	60, 72	16.00
8 to 16	48, 60, 72	16.50
7	48, 60	17.75
8	48, 60	19.00
4, 5¼	40	19.50
3	40	20.50
2½	24, 30	21.00
2	24, 30	23.00
	Carbon	
40	100, 110	7.50
35	100, 110	7.50
30	84, 110	7.50
24	72 to 104	7.50
17 to 20	84, 90	7.50
14	60, 72	8.00
10, 12	60	8.25
8	60	8.50

Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Metallurgical Coke

Price per Net Ton

Beehive Ovens	
Connellsville, furnace..	$13.50-15.50
Connellsville, foundry..	16.00-18.00
New River, foundry	16.50
Wise county, foundry..	15.35
Wise county, furnace..	14.60
Oven Foundry Coke	
Kearney, N. J., ovens.	$22.00
Everett, Mass., ovens. New England, del.‡.	23.35
Chicago, ovens	20.40
Chicago, del.	†21.85
Detroit, del.	24.16
Terre Haute, ovens	20.20
Milwaukee, ovens	21.15
Indianapolis, ovens	19.85
Chicago, del.	23.19
Cincinnati, del.	22.66
Detroit, del.	23.61
Ironton, O., ovens	19.40
Cincinnati, del.	21.63
Painesville, O., ovens..	20.90
Buffalo, del.	23.42
Cleveland, del.	22.55
Erie, del.	22.70
Birmingham, ovens	17.70
Philadelphia, ovens	21.05
Swedeland, Pa., ovens.	21.00
Portsmouth, O., ovens.	19.50
Detroit, ovens	20.65
Detroit, del.	*21.70
Buffalo, del.	22.75
Flint, del.	22.98
Pontiac, del.	21.98
Saginaw, del.	23.30

Includes representative switching charge of: *, $1.05; †, $1.45. ‡ Or within $4.03 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens
(Price effective as of Aug. 5)

Pure benzol	20.00
Toluol, one degree	20.50-26.50
Toluol, two degrees	23.00-26.50
Industrial xylol	20.50-26.50

Per ton bulk, ovens
Sulphate of ammonia $45.00

Per pound, ovens
(Effective as of Oct. 1)

Phenol, 40 (carlots, returnable drums)	13.50
Do., less than carlots	14.25
Do., tank cars	12.50

(Effective as of Oct. 25)

Naphthalene flakes, balls, bbl to jobbers, "household use"	13.75

Refractories

(Prices per 1000 brick, f.o.b. plant)

Fire Clay Brick

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $100. Hard-fired, $135 at above points.

High-heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., Ottawa, Ill., $66.

Ladle Brick

Dry Press: $55, Freeport, Merill, Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., Ottawa, Ill., $90; Beach Creek, Pa., $80.

Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa., $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-31.00; single paper bags, $35.00-35.50.

Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting,, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibonsburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (natural)

Lower Lake Ports

(Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon effective after Dec. 31, 1948, are for buyer's account.)

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%	17.00
Brazil iron ore, 68-69%	19.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

Long term contracts, involving large tonnages, prices are nominal; nearby, 48%, duty paid, 81.8c-83.8c per long ton unit, c.i.f. United States ports; prices on lower grades adjusted to manganese content and impurities.

Chrome Ore

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$25.50-$26.00
45% no ratio	28.50
48% no ratio	29.00-30.00
50% no ratio	29.50-30.50
Brazilian—nominal	
44% 2.5:1 lump	$33.65
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb, Mo., cont., Mines	$0.90

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS			STRIP		BARS				PLATES	
	H-R 10 Ga.	C-R 17 Ga.	Gal. *10 Ga.	†H-R	†C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½" & up	H-R Alloy **4140	Standard Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
New York (city)	6.00	6.66	7.00	5.92	...	5.77	6.56	8.68	5.53	5.90	7.36
New York(c'try)	5.80	6.46	6.80	5.72	...	5.57	6.36	8.48	5.33	5.70	7.16
Boston (city) ..	6.10	6.70	7.60	6.10	...	5.67	6.42	8.72	5.57	5.95	7.40
Boston (c'try)..	5.95	6.55	7.55	5.95	...	5.52	6.27	8.57	5.42	5.80	7.25
Phila. (city)...	5.72	6.64	7.43	5.60	...	5.55	6.34	8.40	5.25	5.53	6.74
Phila. (c'try)...	5.57	6.59	7.28	5.45	...	5.40	6.19	8.25	5.10	5.38	6.59
Balt. (city) ...	5.46†	6.36	7.26	5.52	...	5.57	6.31	...	5.51	5.71	7.16
Balt. (c'try)...	5.31†	6.21	7.11	5.37	...	5.42	6.16	...	5.36	5.56	7.01
Norfolk, Va. ..	5.80	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse) .	5.84-6.00	...	...	5.90	...	5.91-5.95	6.61	...	5.85-5.89	6.05-6.09	7.50-7.54
Buffalo (del.)..	5.00	6.05	7.85	5.49	6.50	5.20	6.05	10.13	5.25	5.50	7.06
Buffalo (w'hse)	4.85	5.90	7.70	5.34	6.35	5.05	5.90	9.98	5.10	5.35	6.91
Pitts. (w'hse)..	4.90§	5.75[8]	7.05	5.10	6.00	4.90	5.65	9.60	4.90	5.05-5.10	6.55
Detroit (w'hse) .	4.85-5.00§	5.75-5.85[8]	7.15	5.00-5.35	5.95-6.00	5.45	6.17	8.12	5.45	5.65-5.80	7.10
Cleveland (del.)	5.00†	5.90‡	6.80-7.01	5.15-5.18	6.00-6.40	5.15-5.16	5.85	8.24-8.40	5.35-5.36	5.35-5.36	6.80-6.81
Cleve. (w'hse).	4.85†	5.75‡	6.65-6.86	5.00-5.03	5.85-6.25	5.00-5.01	5.70	8.24-8.25	5.20-5.21	5.20-5.21	6.65-6.66
Cincin. (w'hse).	5.25	6.14	6.98	5.55	6.10	5.55	6.10	...	5.40	5.64	6.94
Chicago (city).	5.20	5.90[8]‡	7.20	5.00	6.67-6.83	5.05	5.85	8.25[9]	5.05	5.25	6.70
Chicago (w'hse)	4.85-5.05	5.75[8]‡	7.05	4.85	6.52-6.68	4.90	5.70	8.10[9]	4.90	5.10	6.55
Milwaukee(city)	5.38	6.08[8]‡	7.38	5.18	6.82-7.01	5.23	6.03	8.43[9]	5.23	5.43	6.88
St. Louis (del.)	5.34§	6.24[8]	7.44	5.34	6.64	5.39	6.19[12]	6.64	5.39	5.59	7.04
St. L. (w'hse).	5.19§	6.09[8]	7.29	5.19	6.49	5.24	6.04[12]	9.49	5.24	5.44	6.89
Birm'ham (city)	5.20§	...	6.60	5.20	...	5.15	6.66-6.83	...	5.15	5.40	7.41-7.73[20]
Birm'ham(c'try)	5.05§	...	6.45	5.05	...	5.00	6.51-6.68	...	5.00	5.25	7.26-7.58[20]
Omaha, Nebr...	6.10-6.35	...	10.04	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	6.60§	8.05	8.20†	6.80	9.50	6.25	8.20	...	6.10	6.30	8.20
L. A. (w'hse) .	6.45§	7.90	8.05†	6.65	9.35	6.10	8.05	...	5.95	6.15	8.05
San Francisco..	6.15[21]	7.50	8.10	6.75[21]	8.25[18]	5.90[21]	7.55	10.85[3]	5.90	6.35	8.10
Seattle-Tacoma.	6.35[17]	7.90[5]	8.25	6.70[17]	...	6.20[17]	8.15[1]	9.45[3]	6.30[17]	6.35[17]	8.40[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [3]—1000 to 4999 lb; [5]—450 to 1499 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [12]—1000 lb and over; [17]—300 to 999 lb; [18]—1500 to 1999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † base price, does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ top level of quoted range is nominal.

PRICES OF LEADING FERROALLOY PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P, 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c, Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, **1.50% C grade, 18-20% Si,** 8.95c per lb **of alloy, carload packed, 9.70c,** ton lot 10.60c, **less ton 11.60c. Freight allowed. For** 2% C grade, **Si 15-17.5%,** deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr. c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max, 0.03% C 31.85c per lb of contained Cr, 0.04% C 29-75c, 0.06% C 28.75c, 0.10% C 28.25c- 28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium. ton lot $1.05, less ton $1.07. Delivered, Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90-21.70c; ton lots 21.00-22.60c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.) C.l., lump, bulk, regular 19.0c per lb of Si c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.15c per lb of alloy, ton lots packed 9.55c, 200 to 1999 lb 9.90c, smaller lots 10.40c, Delivered. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr.). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l, packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

(*Please turn to Page* 162)

UNIVERSITY OF MICHIGAN LIBRARIES

Copper and Zinc Drop Further

Custom smelters offer electrolytic at 20.00c in effort to attract buying support. Mill product prices now based on 21.50-cent copper. Prime western zinc drops to 13.00c

New York—Numerous price reductions were posted in nonferrous metal markets last week, following refusal of buyers to support previously established lower levels. These reductions affected principally copper and zinc and allied products, including scrap.

Copper—Although mine producers failed to officially post lower electrolytic copper prices, some of their subsidiary companies lowered copper mill products to a 21.50-cent copper basis. Electrolytic copper was offered at 20.00c by custom smelters on Thursday, after having been quoted at 21.50c earlier in the week. Under the circumstances, the market was quotable at 20.00c to 21.50c, delivered Connecticut Valley.

Effective as of Apr. 19, Scovill Mfg. Co. reduced prices for brass and copper alloy products to levels based on 21.50-cent copper and lower prices for zinc. This action was followed by similar action taken by other leading producers.

Custom smelters reduced their buying prices for scrap 1 cent a pound on Monday and an additional 1½ cents a pound on Wednesday. The new levels are equivalent to a price of 16.00c to 16.50c a pound for refined copper after allowing for refining costs and other charges. The new quotations are 13.50c for No. 1 heavy copper wire, 12.50c for No. 2 wire scrap, and 11.50c for light copper scrap.

Zinc—When principal buyers of zinc, including galvanizers, die casters and brass mills, remained out of the market following the 1-cent drop in zinc to a 14-cent level, prices were reduced 1-cent further on Tuesday to the basis of 13.00c, East St. Louis, for prime western. This represents the fourth decrease in zinc for a total decline of 4.50 cents a pound since Mar. 23.

Practically all zinc transactions for some time have been on the basis of "price prevailing on date of shipment" or on an average price for a stated period. Consequently, most consumers have been partially protected during this period of declining prices.

Recent price declines in zinc, coupled with those in lead, have forced several small mines to close down in the Tri-State field. Other independents have cut miners' pay 50 cents per day. Some members of the Tri-State Ore Producing Association are discussing sharp curtailments in production.

Lead—A firmer undertone developed in the lead market last week following announcement by the Federal Bureau of Supply that it would accept metal for the permanent stockpile in excess of the quotas originally set for the current fiscal year. The government recently purchased a substantial tonnage of lead at 15.00c per pound. This had a strong stabilizing effect on the market and induced industrial consumers to resume more active purchasing.

Shipments of replacement batteries during March dropped to 555,000 units in March from 826,000 in February and 1,679,000 in March, 1948, according to the Association of American Battery Manufacturers Inc. Shipments in the first quarter amounted to only 2,624,000 units compared with 6,327,000 units in the like 1948 period, the decline being attributed in a large measure to the mild winter experienced in a large section of the country.

Tin—No new developments were noted in the domestic tin market, prices being fixed at the $1.03 level.

Allocations of pig tin by the government during March totaled only 3295 tons, the smallest for any month in more than 10 years. Allocations for the first quarter amounted to 11,506 tons against 15,491 tons in the first quarter of last year. Imports in March totaled 8792 tons, the largest for any month in years, while output by the Longhorn smelter totaled 3104 tons, making the total of new supplies 11,896 tons. Approximately 6000 tons were believed to have been transferred to the permanent stockpile, leaving an increase of 2714 tons in reported stocks of 27,903 tons.

Magnesium—W. S. Loose, sales manager, Magnesium Division, Dow Chemical Co., forecasts a 60 per cent increase in consumption of primary magnesium during 1949 as compared with 1948. Speaking at the fifth annual meeting of the Magnesium Association last week in Chicago, he said new markets are beginning to open up and that increased consumption of cast and wrought metal contemplated in plans for a 70-group air force will lead to a significant expansion in requirements of primary magnesium. He pointed out that a decline in the amount of good secondary magnesium ingot on the market also will be a contributing factor toward increased use of primary production.

EDWARD H. SNYDER

Elected president of American Zinc Institute at annual meeting in St. Louis Apr. 11-12. Mr. Snyder is president of Combined Metals Reduction Co., Salt Lake City, Utah.

To Build Plants in Chile

New York—Cornelius F. Kelley, chairman, and James R. Hobbins, president, Anaconda Copper Mining Co. and Chile Copper Co. have announced that preparations are being made to extract copper from the sulphide ores and the sulphide content of mixed ores at the Chuquicamata mine of the latter company. This property is believed to be the greatest known copper deposit in the world.

The ore mined at the Chuquicamata mine from the beginning of operations in 1915 to the present has been exclusively from oxide ore and from mixed ore. Substantial tonnages of oxide ore remain, but in order to provide for the future operation of the property it has become necessary to begin the construction of plant facilities to process the extraction of copper from sulphides from which the principal future production of copper will come.

The first units of the plant will consist of a concentrator, a smelter and a converting plant. These plants together with 12 miles of railroad lines, a 45-mile water supply line able to deliver 40,000 tons of water daily, additional housing and miscellaneous facilities, are expected to cost $70 million.

Canadian Metals Decline

Montreal—Consolidated Mining & Smelting Co. of Canada Ltd. reduced its price for zinc 1 cent a pound last week to the basis of 14.00c for prime western, 14.75c for Grade A and 15.00c for special high grade.

Noranda Mines reduced the price of copper to 21.50c a pound. These changes were made following announcements of lower prices in the United States.

Will Increase Cobalt Output

Washington — United States will help the United Kingdom increase its production of cobalt in return for a five-year option to buy 10 per cent of the increased cobalt production for U. S. stockpiles, the Economic Cooperation Administration announced last week. This assistance will consist of a $550,000 authorization by ECA to finance procurement of American-made plant items for use in expanding the Northern Rhodesia plant of the Rhokana Corp.

By procuring the plant items in the United States, the Rhokana Corp. will be able to complete its expansion program 18 months ahead of its original schedule which was based on procuring the items in the United Kingdom.

NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

Copper: Electrolytic, 20.00-21.50, Conn. Valley; Lake, Nom., Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 15.75-18.50c; 88-10-2 (No. 215) 27.50c; 80-10-10 (No. 305) 23.75c; No. 1 yellow (No. 405) 13.50-16.00c.

Zinc: Prime western 13.00c, brass special 13.15c, intermediate 13.50c, East St. Louis; high grade 14.00c, delivered.

Lead: Common 14.80-14.85c; chemical, 14.90c; corroding 14.90-14.95c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloy (6-6 type) 17.50; No. 12 foundry alloy (No. 2 grade) 17.00; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00c; grade 2, 17.00c; grade 3, 16.00c; grade 4, 15.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

Antimony: American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $85-$88 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 71.50c per ounce.

Platinum: $72-$75 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 35.18; yellow brass 31.77; commercial bronze, 95%, 35.11; 90%, 34.63; red brass, 85%, 33.64; 80%, 33.17; best quality, 32.64; nickel silver, 18%, 44.78; phosphor-bronze, grade A, 5%, 54.15.

Rods: Copper, hot rolled 31.03; cold drawn 32.28; yellow brass, free cutting, 26.25; commercial bronze, 95% 34.80; 90% 34.32; red brass 85% 33.33; 80% 32.86.

Seamless Tubing: Copper 35.22; yellow brass 34.78; commercial bronze 90% 37.29; red brass 85% 36.55; 80% 36.08.

Wire: Yellow brass 32.06; commercial bronze, 95% 35.40; 90% 34.92; red brass, 85% 33.93; 80% 33.46; best quality brass 32.90.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weatherproof, f.o.b. eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

ALUMINUM

Sheets and Circles: 2s and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $20.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $20.00 per cwt; cut coils, $20.00. Traps and Bends: List price plus 53%.

ZINC

Sheets, 18.00c, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 17.25c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 16.25c; over 12-in., 17.25c.

NICKEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c, Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. Ave.	23.486	18.825	17.056	103.00	17.00	38.50	40.00	71.50
Apr. 1-2..	23.25–23.50	15.85–16.80	16.00	103.00	17.00	38.00	40.00	71.50
Apr. 4 ...	23.25–23.50	15.80–15.85	16.00	103.00	17.00	38.50	40.00	71.50
Apr. 5 ...	23.25–23.50	15.80–15.85	15.00	103.00	17.00	38.50	40.00	71.50
Apr. 6-13.	23.25–23.50	14.80–14.85	15.00	103.00	17.00	38.50	40.00	71.50
Apr. 14-18	21.50	14.80–14.85	14.00	103.00	17.00	38.50	40.00	71.50
Apr. 19-20	21.50	14.80–14.85	13.00	103.00	17.00	38.50	40.00	71.50
Apr. 21 ..	20.00–21.50	14.80–14.85	13.00	103.00	17.00	38.50	40.00	71.50

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9%, flake, f.o.b. Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34c; cast, 31.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 48.00c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,900 lb, 17.00c, f.o.b. Niagara Falls, N. Y.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland. Add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb, 61.2c; 2000 to 9900 lb, 59.4c. Prices f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 42.50c, f.o.b. Cleveland; 43.00c, Detroit; 42.00c, f.o.b. Philadelphia.

Stannous Sulphate: Less than 2000 lb in 100 lb kegs, 100.00c, in 400 lb bbl, 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 97.00c; in 100 lb kegs, 98.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.125	21.125	20.375
Yellow brass	18.000	17.750	17.125
Commercial Bronze			
95%	20.000	19.750	19.250
90%	19.875	19.625	19.125
Red Brass			
85%	19.625	19.375	18.875
80%	19.375	19.125	18.625
Best Quality (71-80%)	19.125	18.875	18.375
Muntz Metal	17.250	17.000	16.500
Nickel, silver, 10%...	19.625	19.375	9.8125
Phos. bronze, A.....	22.625	22.375	21.375
Naval brass	17.750	17.500	17.000
Manganese bronze ...	17.750	17.500	16.875

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, f.o.b. shipping point, carload lots)

No. 1 copper 14.50-15.00, No. 2 copper 13.50-14.00, light copper 12.50-13.00, composition red brass 10.50-10.75, auto radiators 8.50, heavy yellow brass 7.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 13.50, No. 2 copper 12.50, light copper 11.50, refinery brass (60% copper), per dry copper content 11.50.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 13.00-13.25, No. 2 12.00-12.25, light copper 11.00-11.25, No. 1 composition red brass 9.00-9.25, No. 1 composition turnings 8.50-8.75, mixed brass turnings 7.00-7.25, new brass clippings 12.00-12.25; No. 1 brass rod turnings 8.00-8.25, light brass 6.00-6.25, heavy yellow brass 7.00-7.25, new brass rod ends 9.00-9.25, auto radiators, unsweated 7.75-8.00, cocks and faucets 8.00-8.25, brass pipe 8.25-8.50.

Lead: Heavy 8.00-8.50, battery plates 4.25-4.50, linotype and stereotype 11.50-12.00, electrotype 9.50-10.00, mixed babbitt 11.50-12.00, solder joints, 14.00-14.50.

Zinc: Old zinc 5.00-5.50, new die cast scrap 5.00-5.50, old die cast scrap 3.00-3.50.

Tin: No. 1 pewter 56.00-58.00, block tin pipe 78.00-80.00, No. 1 babbitt 43.00-45.00, siphon tops 47.00-49.00.

Aluminum: Clippings 2S 10.00-10.50, old sheets 6.50-7.00, crankcase 6.50-7.00, borings and turnings 3.50, pistons, free of struts, 6.50-7.00.

UNIVERSITY OF MICHIGAN LIBRARIES

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt	$25.00
No. 2 Heavy Melt	23.00
No. 1 Busheling	25.00
No. 1 Bundles	25.00
No. 2 Bundles	21.00-22.00
No. 3 Bundles	20.00-21.00
Heavy Turnings	22.00-23.00
Machine Shop Turnings	17.00-18.00†
Mixed Borings, Turnings	17.00-18.00†
Short Shovel Turnings	18.00-18.50
Cast Iron Borings	20.00-21.00†
Bar Crops and Plate	26.50-27.00
Low Phos. Steel	26.50-27.00

Cast Iron Grades†

No. 1 Cupola Cast	30.00-31.00
No. 1 Machinery Cast	32.50-33.50
Charging Box Cast	30.50-31.50
Heavy Breakable Cast	27.00-28.00
Brake Shoe	30.00-31.00

Railroad Scrap

No. 1 R.R. Heavy Melt	27.00†
Axles	35.00-36.00
Rails, Random Lengths	30.00-31.00*
Rails, 2 ft and under	35.00-36.00
Rails, 18 in. and under	37.00-38.00
Railroad Specialties	32.00-33.00
Angles, Splice Bars	35.00-36.00

* Brokers' buying prices.
† Nominal.

CLEVELAND

Heavy Melt. Steel	$20.00†
No. 1 Busheling	20.00†
No. 2 Bundles	18.00†
Machine Shop Turnings	14.00†
Mixed Borings, Turnings	18.50-19.00
Short Shovel Turnings	18.50-19.00
Cast Iron Borings	18.50-19.00
Bar Crops and Plate	25.50-26.00†
Punchings & Plate Scrap	25.50-26.00†
Cut Structurals	26.50†

Cast Iron Grades†

No. 1 Cupola	31.00-32.00
Charging Box Cast	29.00-31.00
Stove Plate	27.00-29.00
Heavy Breakable Cast	23.00-24.00
Unstripped Motor Blocks	23.00-24.00
Malleable	27.00-28.00
Brake Shoes	24.00-24.50
Clean Auto Cast	34.00-34.50
No. 1 Wheels	29.00-30.00
Burnt Cast	22.00-23.00

Railroad Scrap

No. 1 R.R. Heavy Melt	29.00-30.00
R.R. Malleable	27.00-28.00†
Rails, 3 ft and under	37.00-38.00
Rails, Random Lengths	30.00-32.00
Cast Steel	31.00
Railroad Specialties	31.00
Uncut Tires	25.00
Angles, Splice Bars	32.00-33.00

† Nominal.

VALLEY

Heavy Melt. Steel	$22.00†
No. 1 Bundles	22.00†
No. 2 Bundles	20.00†
Machine Shop Turnings	14.50-15.00†
Short Shovel Turnings	19.50-20.00†
Cast Iron Borings	19.50-20.00†
Low Phos.	25.00-26.00†

Railroad Scrap

No. 1 R.R. Heavy Melt	30.00-31.00

† Nominal.

MANSFIELD

Machine Shop Turnings	$14.50-15.00†
Short Shovel Turnings	19.50-20.00†

† Nominal.

CINCINNATI

No. 1 Heavy Melt. Steel	$21.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	20.00
Nos. 1 & 2 Bundles	18.00
Machine Shop Turnings	10.00
Mixed Borings, Turnings	10.00
Short Shovel Turnings	10.00
Cast Iron Borings	11.00

Cast Iron Grades

No. 1 Cupola Cast	30.00
Charging Box Cast	24.00
Heavy Breakable Cast	22.00
Stove Plate	21.00
Unstripped Motor Blocks	20.00
Brake Shoes	18.00
Clean Auto Cast	30.00
Drop Broken Cast	34.00

Railroad Scrap

No. 1 R.R. Heavy Melt	21.00
R.R. Malleable	24.00
Rails, Rerolling	30.00
Rails, Random Lengths	26.00
Rails, 18 in. and under	38.50

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 1 Bundles	$19.00-20.00
No. 2 Bundles	17.00-18.00
No. 2 Heavy Melt. Steel	18.00-19.00
No. 1 Busheling	18.00-19.00
Machine Shop Turnings	11.00-12.00
Mixed Borings, Turnings	12.00-13.00
Short Shovel Turnings	13.00-14.00
Cast Iron Borings	13.00-14.00
Punchings & Plate Scrap	19.00-20.00

Cast Iron Grades

No. 1 Cupola Cast	24.00-26.00
Heavy Breakable Cast	19.00-21.00
Clean Auto Cast	24.00-26.00

BUFFALO

No. 1 Heavy Melt. Steel	$23.00-24.00
No. 2 Heavy Melt. Steel	20.00-21.00
No. 1 Bundles	20.50-21.00
No. 2 Bundles	20.00-21.00
No. 1 Bushelings	20.00-21.00
Machine Shop Turnings	14.00-15.00
Mixed Borings, Turnings	17.00-17.50
Cast Iron Borings	17.00-17.50
Short Shovel Turnings	18.00-18.50
Low Phos.	25.00-26.00

Cast Iron Grades

Mixed Yard Cast	27.00-28.00
Heavy Breakable	26.00-27.00
Malleable	31.00-32.00
Clean Auto Cast	32.00-33.00

Railroad Scrap

Rails 3 ft. and under	33.00-34.00
Scrap Rails	28.00-29.00
Specialties	29.50-30.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$22.50-23.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	20.00
No. 1 Bundles	22.50-23.00
No. 2 Bundles	18.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	14.00
Short Shovel Turnings	20.00
Bar Crop and Plate	27.00
Punchings & Plate Scrap	27.00
Cut Structurals	25.00
Elec. Furnace Bundles	22.50-23.00
Heavy Turnings	22.50-23.00
No. 1 Chemical Borings	Nom.

Cast Iron Grades

No. 1 Cupola Cast	27.00
No. 1 Machinery Cast	29.00-30.00
Charging Box Cast	27.00-28.00
Heavy Breakable Cast	27.00-28.00
Unstripped Motor Blocks	24.50
Clean Auto Cast	29.00-30.00
No. 1 Wheels	29.00-30.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$16.00-17.00
No. 2 Heavy Melt. Steel	14.00-14.50
No. 1 Busheling	14.00-14.50
No. 1 Bundles	16.00-17.00
No. 2 Bundles	14.50
No. 3 Bundles	nominal
Machine Shop Turnings	5.00-7.00
Mixed Borings, Turnings	5.00-7.00
Short Shovel Turnings	8.00-9.00
Punchings & Plate Scrap	16.50-17.50
Cut Structurals	nominal
Elec. Furnace Bundles	16.50-17.50

Cast Iron Grades

No. 1 Cupola Cast	20.00-21.00
No. 1 Machinery	21.00-22.00
Charging Box Cast	18.00-18.50
Heavy Breakable	18.00-18.50
Unstripped Motor Blocks	nom.
Malleable	nom.

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$16.00-17.00
No. 2 Heavy Melt. Steel	13.50
No. 1 Bundles	15.00-15.50
No. 1 Busheling	13.50
Machine Shop Turnings	7.50-8.50
Mixed Borings, Turnings	7.50-8.50
Short Shovel Turnings	10.00-11.00
Bar Crops and Plate	18.00-19.00
Punchings & Plate Scrap	18.00-19.00
Chemical Borings	13.00-14.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-26.00
Mixed Cast	22.00-24.00
Heavy Breakable Cast	24.00-25.00
Stove Plate	22.00-24.00
Unstripped Motor Blocks	18.00-20.00

CHICAGO

No. 1 Heavy Melt. Steel	$22.00-23.00
No. 2 Heavy Melt. Steel	19.00-22.00
No. 1 Bundles	22.00-23.00
No. 2 Bundles	18.00-20.00
No. 3 Bundles	17.00-18.00*
Machine Shop Turnings	12.00-13.00
Mixed Borings, Turnings	13.00-14.00
Short Shovel Turnings	14.00-15.00
Cast Iron Borings	13.00-14.00
Bar Crops and Plate	24.00-25.00
Punchings	24.00-25.00
Elec. Furnace Bundles	23.00-24.00
Heavy Turnings	20.00-21.00
Cut Structurals	24.00-25.00

Cast Iron Grades*

No. 1 Cupola Cast	29.00-30.00
Clean Auto Cast	29.00-30.00
No. 1 Wheels	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	23.00-25.00
Malleable	30.00-31.00*
Rails, Rerolling	30.00-32.00
Rails, Random Lengths	25.00-26.00
Rails, 2 ft. and under	31.00-32.00
Rails, 18 in. and under	32.00-33.00
Railroad Specialties	27.00-28.00*
Angles, Splice Bars	26.00-27.00

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	$23.00-24.00
No. 2 Heavy Melt. Steel	20.00-21.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings	14.00-15.00

Cast Iron Grades

No. 1 Cupola Cast	31.00-32.00
Charging Box Cast	26.00-27.00
Heavy Breakable Cast	24.00-25.00
Brake Shoes	22.00-23.00
Clean Auto Cast	31.00-32.00
Burnt Cast	23.00-24.00

Railroad Scrap

R.R. Malleable	23.00-24.00
Rails, Rerolling	28.00-30.00
Rails, Random Lengths	23.00-24.00
Rails, 3 ft. and under	30.00-31.00
Uncut Tires	23.00-24.00
Angles, Splice Bars	30.00-31.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	22.00
No. 2 Bundles	20.00
Long Turnings	20.00
Short Shovel Turnings	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	25.00-26.00
Cut Structurals	25.00-26.00

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Stove Plate	30.00-31.00
No. 1 Wheels	30.00-31.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	24.00
R.R. Malleable	nominal
Rails, Rerolling	30.00-32.00
Rails, 3 ft. and under	31.00-32.00
Angles and Splice Bars	31.00-32.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
Nos. 1 & 2 Bundles	18.00
Machine Shop Turnings	12.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-30.00

Railroad Scrap

No. 1 Heavy Melting	22.00
Wheels	22.00
Rails, Random Lengths	22.00

SEATTLE

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	17.50
Nos. 1 & 2 Bundles	18.00
No. 3 Bundles	nom.
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Punchings & Plate Scrap	30.00
Cut Structurals	30.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-30.00
Heavy Breakable Cast	20.00-22.00
Stove Plate	25.00
Unstripped Motor Blocks	20.00
Malleable	25.00
Brake Shoes	25.00
Clean Auto Cast	25.00
No. 1 Wheels	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	22.00
Rails, Random Lengths	22.00
Angles and Splice Bars	22.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$22.00
No. 2 Heavy Melt. Steel	20.00
Nos. 1 & 2 Bundles	18.00
No. 3 Bundles	15.00
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.50-13.00
Punchings & Plate Scrap	28.00-31.00

Cast Iron Grades

No. 1 Cupola Cast	27.00-32.00

HAMILTON, ONT.

(Ceiling prices, delivered)

Heavy Melt.	$23.00
No. 1 Bundles	23.00
Mechanical Bundles	21.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	23.00
Rails, Rerolling	26.00
Bushelings	17.50
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	48.00
No. 2 Cast	44.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

Sheets, Strip . . .

Mills may curtail output of cold-rolled strip if backlogs continue to drop

Sheet Prices, Page 138

Pittsburgh — Growing competitive situation in silicon sheets has forced further reduction in premium prices quoted by Allegheny Ludlum Steel Corp. and Follansbee Steel Corp. Allegheny has reduced its transformer C grade (comparable to transformer 72) from $10.05 to $8.05 per 100 pounds, effective Apr. 18. Follansbee Steel Corp. has reduced all its transformer grades to competitive levels quoted by major producers.

Reduction of one cent in zinc prices last week again automatically lowers coating extras on galvanized products an average of $1.50 a ton.

Further hold-ups of shipments and order cancellations for hot and cold-rolled sheets are reported by major producers. However, sellers have had little difficulty to date in filling resultant openings in production schedules.

Nonintegrated cold-rolled strip producers continue to charge premium prices despite the fact production schedules have been reduced.

Niles Rolling Mill Co., Niles, O., effective Apr. 18, reduced hot-rolled annealed 19 gage and lighter sheets $10 per ton to $4.15 per 100 pounds, quoted by leading competitors; galvanized sheets were reduced from $5 to $4.40; and galvannealed sheets from $5.55 to $4.95 per 100 pounds. Company also has reduced its armature and electrical silicon sheet prices to competitive levels of $5.45 and $5.95, respectively.

In addition to general easing in demand for silicon sheets, sellers report increased tonnage of enameling sheets likely will be available for delivery in May and subsequent months. Distribution of flat-rolled sheets and strip continues on mill allotment basis, except for stainless and lower grade silicon items. However, there are indications that the industry will be distributing its products on a normal prewar basis by early third quarter.

Detroit—Effective Apr. 16 the Great Lakes Steel Corp. reduced size extras on hot and cold-rolled sheet and strip to levels competitive with other producers. The company's schedule has been above that of some other producers for several months.

Philadelphia—The leading sheet producer has opened books for the entire third quarter on all grades. Most others also are accepting tonnage for shipment beyond the end of the first half, although in certain cases they are restricting sales at the moment to July only. Meanwhile, various producers are continuing to have spot openings, as a result of order cutbacks and cancellations. These openings, however, are usually filled in promptly, although some sellers complain of difficulty in disposing of overages as quickly as they desire.

Boston — Cold-rolled strip shipments are in excess of incoming orders and mills are reducing backlogs steadily where production schedules

with

KENNAMETAL
ROLL-TURNING
TOOLS

It has been customary to rough grind very hard chilled cast iron rolls (75-90 Scleroscope), and to machine softer rolls (60-75 Scleroscope) with high speed steel tools.

The new, *and more economical,* method for both types is turning with Kennametal tools designed especially for plunge cutting on the usual hand-feed roll lathe.

They *cut the machining time in half,* as many roll shops have demonstrated to their profit.

These tools are rugged. The "business end" is Kennametal—a very hard cemented carbide, unusually strong and tough. It stands the gaff of crashing with a hefty cut through scale, chill balls, and burned spots (that wear grinding wheels fast and turn the edges of high speed steel tools)—*and does this in a hurry!*

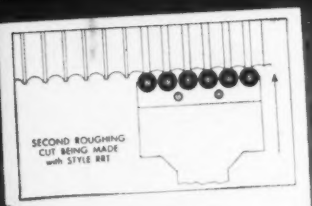
Two general types of these tools are available:

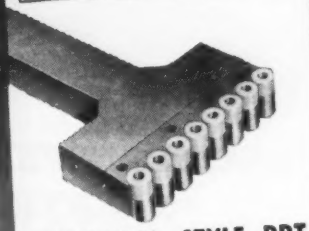
Style RRT, recommended for roughing, has a series of indexable Kennametal cylinders, or "buttons", firmly secured to the steel shank. When cylinders become dull they are turned to present new, sharp edges.

Style RT, recommended for finishing, has a flat, advanceable Kennametal blade, secured in position by a clamp and serrated back-up plate. Four cutting edges are usable in succession before any grinding is necessary.

Maintenance of these roll turning tools is very simple. To sharpen, cylinders of the roughing tool are faced on the tops only, and blades of the finishing tool on the long edges only. The marked savings in this technique can be readily visualized.

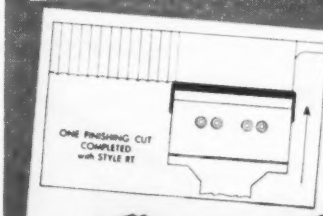
Here then are tools that help to offset the rising costs for time and labor in the manufacture and servicing of mill rolls. Our nearest representative will assist you in applying them to your problems.

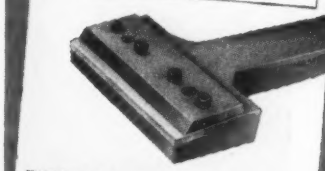




ROUGHING STYLE RRT

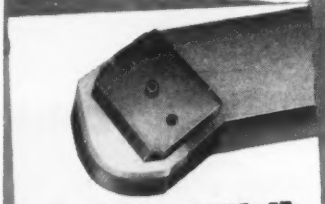
Made in four standard widths— 4", 6", 8", and 10".





FINISHING STYLE RT

Made in four standard widths— 4", 6", 8", and 10".



FILLETING STYLE FT

Clamped-in, advanceable Kennametal blade. Made in six standard sizes — radii for the most common fillets.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

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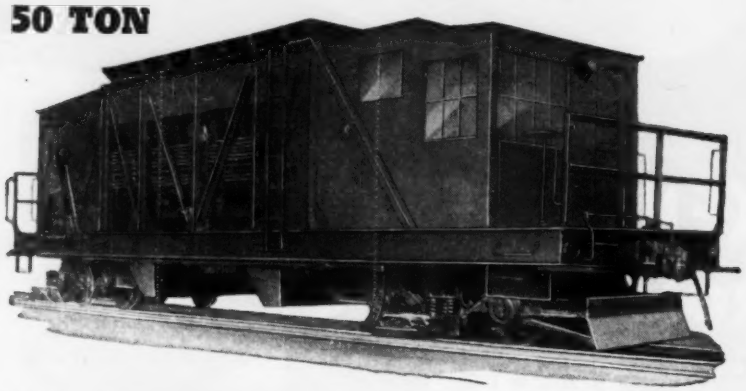
ATLAS

BUILDS INTRA PLANT CARS TO MEET SPECIFIC, INDIVIDUAL TRANSFER PROBLEMS

50 TON

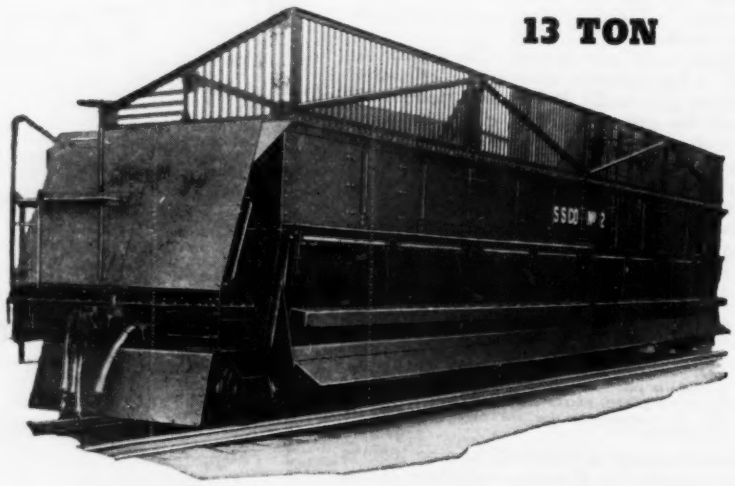


ORE TRANSFER

CENTER BOTTOM DUMP

Double-end control car with operator's cab at each end. Powered with four 75-HP motors. Car equipped with air brakes, pneumatic discharge gates and standard safety equipment and accessories.

13 TON



COKE QUENCHING CAR

Car equipped with coke racks and abrasion-resisting steel plates. Discharge gates individually operated from air cylinders. Car has air brakes and ladders, coke deflectors and standard safety equipment.

ATLAS ENGINEERING SERVICE
IS ALWAYS AT YOUR SERVICE

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS
40 IVANHOE RD. CLEVELAND 10, OHIO

remain near capacity; unless there is a turn upward shortly, however, some decline in output is expected in five to six weeks. Consumers of flat-rolled are drawing on inventories for lower requirements, several of the leading industries having slackened, including clock-making, typewriter assembly, shoe shanks and to some extent textile mill equipment. Inventories are being worked down and are approaching a point where resumption of buying by some users is likely. Volume going into automobile parts and accessories is holding better than the average.

New York—Although sheet sellers are having little difficulty filling up such spot openings as might occur as a result of order cutbacks and cancellations, there is ample evidence that sheet consumers are moving conservatively. In fact, sheet buyers are acting with greater restraint than those of hot carbon bars. This is somewhat the reverse of what had been expected to happen once steel demand in general started to decline, and is ascribed in part, to the fact that pressure for sheets, before the turn set in, was so extremely strong that they over-bought and now have no little amount of high priced inventory to work off.

Some sheet sellers have opened books for at least July delivery on such major products as hot and cold-rolled sheets. To date, however, tonnage has not been booked in the volume anticipated and this may be due in part to the fact that July will not be a heavy consuming month.

Cleveland — Demand for hot and cold-rolled carbon sheets and galvanized sheets continues sufficiently strong to keep one producer's order books completely filled. As a result, this producer finds it advisable to keep a monthly quota system in effect. However, there is increasing question as to firmness of orders.

Dominant in sustaining the demand for hot and cold-rolled carbon sheets is the automotive industry. Another sustaining factor is the move of consumers from conversion steel to regular-priced mill steel. The galvanized sheet demand-supply situation remains tight, largely because of voluntary allocations programs and the relatively small number of producers of this product.

Hot and cold-rolled carbon strip continues in strong demand, although not quite to the extent of sheets.

Demand for silicon sheets has eased considerably, but orders for silicon coil stock continue in fairly good volume from makers of transformers for television sets and the multitude of other electrical devices.

Chicago—Price reductions on carbon strip have been made by Acme Steel Co., this city, hot-rolled being reduced to $3.25 per 100 pounds to meet competitive price and cold-rolled being cut to $4.15, both f.o.b. works, Riverdale, Ill.; these are reductions of $1 and $2 a ton, respectively.

Carbon and galvanized sheet supply locally does not match customer requirements, in spite of rumors in some quarters that the quota system is virtually meaningless as a distribution method. Major mills here

are not current on deliveries and expectations are that the need for allotments will carry into next quarter. Upward trend in cancellations and dererments has made it easier to relieve customer pressure from other directions, but reports that steel is freely available at regular prices are widely disputed by consumers, warehouses and mills. Some buying is unquestionably being held up on the possibility of lower mill prices, but this deferred demand should appear later.

Acme Steel Co., Chicago, has been awarded a contract for 1001 tons of steel strapping and 712,000 seals, at $194,135 by the Chicago Quartermaster Purchasing Office.

Cincinnati — District sheet mills have established allotments of tonnage for June. This action tends to disprove any belief that the plan of alloting tonnage is now unnecessary. Pressure continues on district mills for cold-rolled, hot-rolled, enameling, galvanized, and long ternes, but there is a steady trend toward easier supply in some specialties. Basic prices are holding firm.

Birmingham—Supply of sheets remains "very tight." This is true even though conversion from hot to cold-rolled sheet production at the Fairfield mill has been completed although Tennessee Coal, Iron & Railroad Co. had made no announcement of acceptance of that mill.

St. Louis—Sheet demand in this district continues unabated. March order bookings, with the exception of January, were the largest in the last 12 months. Cancellations were much fewer than expected and were quickly absorbed by other customers. Shipments were nearly 12 per cent above February, but 7 per cent below those of March, 1948.

Los Angeles—Sheet requirements continue to ease as operations flatten out in a number of consuming industries. Demand for hot-rolled is off markedly, although pressure generally remains on delivery of cold-rolled. Offerings in this district of flat-rolled material for third quarter delivery from eastern sources have increased substantially, principally in hot-rolled, electrical and special quality sheets.

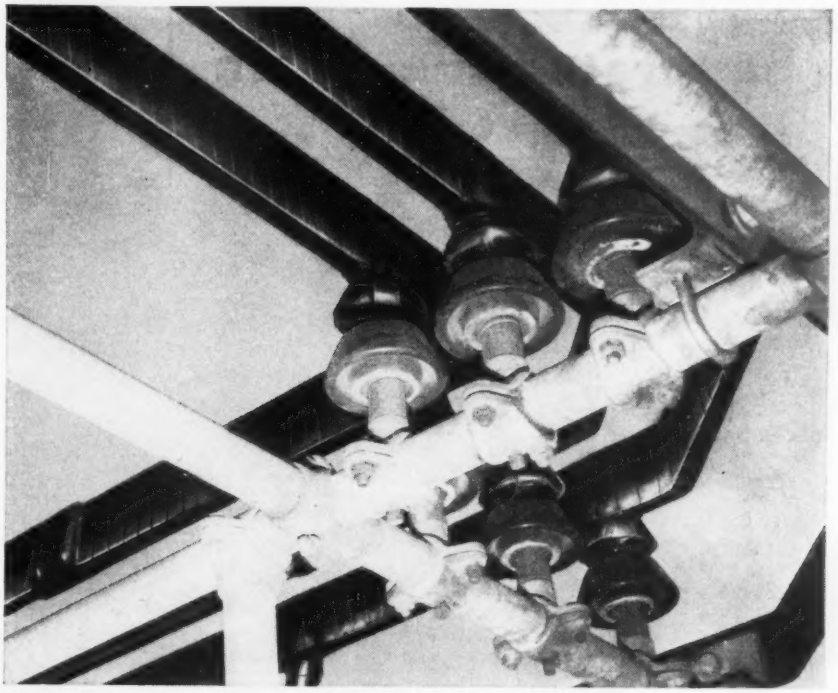
San Francisco—Easing in demand for sheets continues, with most fabricators well supplied. Jobbers are easing purchases, and consumers are cancelling or reselling mill allocations. Galvanized and light-gage cold-rolled sheets are in better demand and lighter supply than heavier gage material.

Export Price List Revised

New York—Reflecting reduction in price of zinc, United States Steel Export Co., U. S. Steel subsidiary, has announced the following new export prices, effective as of Apr. 15, on carlots with freight included to New York, Philadelphia or Baltimore.

	Per Cent off List
American Standard Pipe, T. & C.:	
Butt Weld, 2½ and 3 in., galvanized	23.6
Seamless, 3½ to 6 in., galvanized..	16.1
English Gas Tubes, T. & C.:	
Butt Weld, 2½ and 3 in., galvanized	25.5

Prices are subject to seller's current list of extras and deductions and conditions of sale. All sales are subject to seller's prices in effect at time of shipment.



OUTDOOR BUS INSTALLATION is exposed to extreme temperature, sunlight, moisture and corrosive gases. Yet the insulating material, "SCOTCH" No. 33 Electrical Tape, on the bars and leads is unaffected.

Get two-way protection with this NEW tape

The tough plastic backing on "SCOTCH" No. 33 Electrical Tape gives a high dielectric strength plus sturdy resistance to weathering and corrosion—making an efficient insulation for practically every type of electrical job.

Give this remarkable NEW "SCOTCH" Electrical Tape a try. You'll find it's easier to apply than other materials—gives you a neater, more compact job. Write Dept. S-4 for complete information and a free sample.

Quick facts about "SCOTCH" No. 33 Electrical Tape

- **HIGH DIELECTRIC STRENGTH**—insulates perfectly against charges of over 7,000 volts.
- **TOUGH**—plastic backing resists abrasion, water, acids, alkalies, alcohols.
- **THIN CALIPER**—only .007" thick, requires less room in all insulation work.
- **STRETCHY**—conforms snugly to uneven surfaces, irregular shapes.
- Carries the seal of Underwriters' Laboratories.

Standard roll ¾ in. wide and 66 ft. long. Each roll individually packed in a handy tin.

ANOTHER 3M COMPANY PRODUCT

Made in U. S. A. by

MINNESOTA MINING & MFG. CO., Saint Paul 6, Minnesota

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.*
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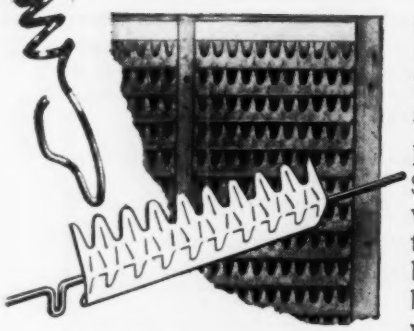
Separates the Grain from the Chaff . . .

CLOSZ* Adjustable Sieves for Combines

made with KEYSTONE WIRE



Closz Adjustable Sieves can be quickly adjusted to any harvesting condition . . . eliminates the need for separate sieves for each crop. Adjusting feature permits instant cleaning without removing sieve from combine . . . reduces grain-waste and clogging. Used as standard equipment on combines and threshers . . . evidence of Closz's outstanding features.

*Hart-Carter Company
Webster City, Ia.—Peoria, Illinois

Sieves are the heart of the grain-cleaning action in combines and threshers. They vibrate at high frequency to aid the cleaning action.

Each sieve slot in Closz Adjustable Sieves is hinged on special Keystone wire. The wire must be stiff to resist torsion, yet ductile enough for severe bending operations. The wire must also be abrasion-resistant to withstand wear due to vibration. And, good spot-welding qualities are required.

We are proud that special-analysis galvanized Keystone wire meets these exacting requirements. Let Keystone's wire specialists help solve *your* industrial wire problems.

KEYSTONE MUSIC SPRING WIRE

SPECIAL ANALYSIS WIRE for all industrial purposes

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

Steel Bars . . .

Bar Prices, Page 138

Philadelphia—While most hot carbon bar sellers have opened books for the third quarter, consumers are showing little interest in future commitments. Producers generally should be able to maintain a fairly good rate of operations throughout the current quarter, but will still have to book more tonnage to do so.

For aircraft, Philadelphia Aviation Supply Office, Navy, has bids on several hundred tons of bars, including 140 tons stainless and 130 tons, nickel alloy steel forging stock.

New York—Hot carbon bar sellers still have some tonnage for sale for delivery in the current quarter. They are not only interested in rounding out these schedules but most of them are booking tonnage for shipment in the third quarter. Buyers, however, have not shown any great interest in future commitments and, in general, the volume of new inquiry continues to ease.

The situation in cold-drawn carbon bars is somewhat mixed with respect to future deliveries. One large seller now has no more to offer for shipment in this quarter, except for some little tonnage that may be available from stocks.

Boston — Depending on size and grade, bar supply ranges from relatively tight to easy with overall demand steadier at levels well below postwar peak. Hot-rolled carbon flats and some small rounds are still a problem with some users while cold-drawn carbon and alloy bars are in ample supply with more tonnage being offered. By end of this quarter, backlogs with some mills will be substantially depleted and backlogs are holding output to current levels. Forge shops pending on automotive and aircraft orders are doing reasonably well, but others are slower. Bolt and nut requirements are down, also screw machine products.

Chicago—Hot-rolled carbon bars are still in active demand, the easing from certain directions being taken up to the extent that delays in delivery still are the rule rather than the exception. One place where slackening in demand has become more pronounced, however, is among forgers, some of whom are operating on a three-day schedule. This is extreme, although a noticeable tapering in forged bar business is acknowledged. Cold-finished bars are now in better supply; while alloys are easy, aircraft and other defense requirements not offering enough of a prop to tighten supply appreciably.

Birmingham—Bar demand is moderately active with most emphasis remaining on concrete reinforcing due to a sizable aggregate of public construction and road work. Mill interests do not expect material slackening in demand for concrete reinforcing for another several months. Merchant bar demand is moderately heavy.

San Francisco—Supplies now exceed demand, and stocks of bars in warehouse and consumer hands are plentiful. A further easing is anticipated.

Plates . . .

Plate Prices, Page 139

New York—As a result of the recent $5 reduction in plates by the Coatesville, Pa., producer to 3.50c per pound, that point is now the governing base on shipments into New York, the delivered price being 3.8286c. This compares with 3.8528c from Sparrows Point, Md., 3.8574c from Conshohocken, Pa., 3.9684c from Claymont, Del., and 3.9936c from Pittsburgh.

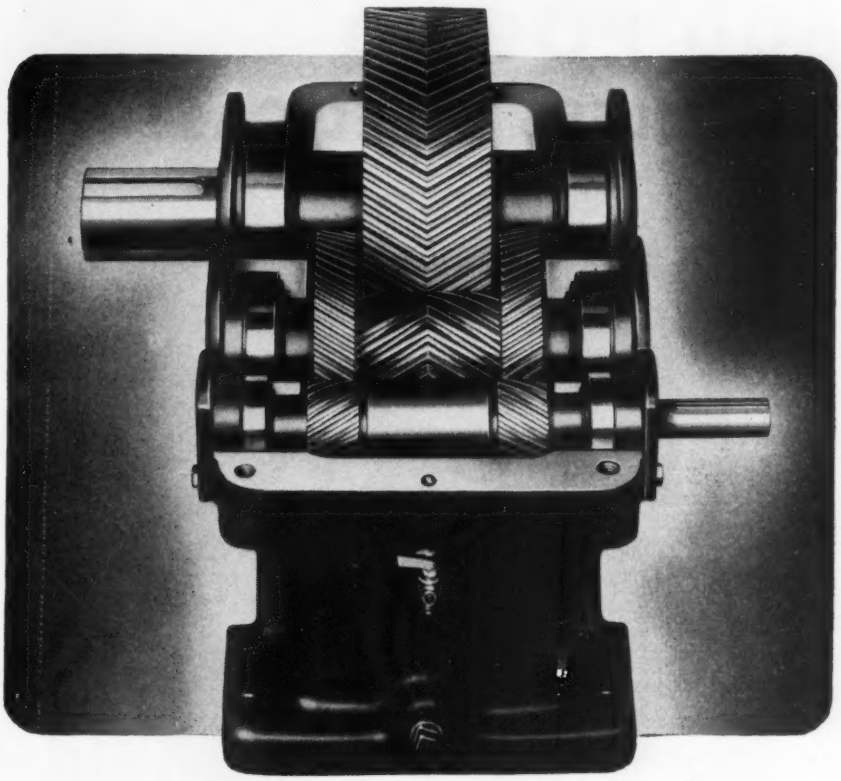
While there is reasonably good demand, some sellers are still in need of tonnage for June rolling and are taking on such business as may be available for shipment beyond that month. Tank business is slow and increasingly competitive. Up to now there has been no seasonal improvement in demand for plates for light fuel storage tanks, although this still may come along a little later. However, notwithstanding the lag in light tank demand, it appears that 3/16 and ¼-inch plate is not plentiful. In fact, some oil companies with tank repairs in prospect are having difficulty in getting light gage plates for delivery within the next couple of months.

Car construction and repair requirements continue relatively light. Jobbers, however, are still interested in building up inventories, with some distributors having relatively little tonnage on hand compared with normal times. There is quite a scattering of export inquiry, but not much buying except where ECA funds are available.

Boston—While premium prices for plates are reduced, there are still spreads in the delivered cost of material. Impact of f.o.b. pricing with consumer paying freight thus becomes intensified in distribution. Arrival of a buyers' market in plates is ahead of schedule and with more tonnage available, including light gages and wider material, buyers strive to place orders at points where steel can be delivered at lowest cost. Noteworthy is improvement in deliveries by some producers in need of tonnage to hold production late this quarter.

Pittsburgh—Structural fabricators report the usual seasonal improvement in inquiries has not materialized. Order backlogs of structural work have been declining steadily since the first of the year and there is increasing concern among fabricators as to prospect of sustaining operations at present levels through remainder of this year. This has resulted in growing competition among fabricators in bidding for new work. Fabricators report there has been no improvement in steel supplies from the mills for April delivery, although there are indications greater tonnage of shapes and plates will be made available over coming months.

Jessop Steel Co. has revised gage deductions on stainless clad plates weighing 4000 pounds or more. The gage deduction schedule made effective Apr. 4 has been revised as follows: For gages over 1½ to 2 inches, there is now no allowable deduction. Previously these deductions ranged from 4 to 6 cents. Company also has revised its specification A-



Shock Resisting

HERRINGBONE SPEED REDUCERS

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THE HORSBURGH & SCOTT CO.

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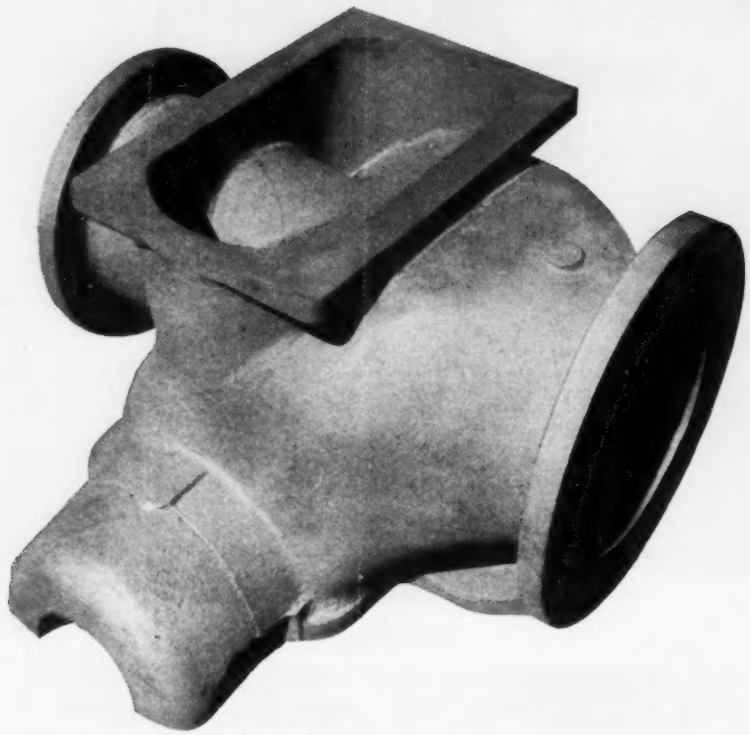

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263 and A-264 and shear test extra to ½-cent, compared to 1½ cents previously.

Philadelphia—Reduction of $5 a ton at the mill to 3.50c per pound brings the delivered price here on plain carbon plates from Coatesville, Pa., down to 3.6484c. This compares with 3.6348c on plates from Conshohocken, Pa., the current minimum; 3.7256c from Sparrows Point; 3.7825c from Claymont, Del. Base prices on these latter three points range from 3.45c, Sparrows Point to 3.55c, Conshohocken, to 3.65c, Claymont. However, as noted in a recent issue, the Claymont producer is quoting 3.45c mill on plates going into flange shop work.

The Coatesville mill, in making its recent reductions also dropped open-hearth alloy plates $12 a ton from 5.10c, mill, to 4.50c and made some revisions in its extra lists. However, it left its gage extras on carbon plates unchanged at 50c for 3/16-inch and 30c for ¼-inch.

Corps of Engineers, Office of the District Engineer, Philadelphia, 121 N. Broad St., will close bids Apr. 25 on two steel barges, 90 x 29 x 7 feet.

Birmingham — Plates remain in heavy demand. Reports from some producing sections are that mills are seeking July tonnage, but indications here are that no appreciable tonnage will be available before the end of the year, at the earliest. Some scattered cutbacks are reported.

Los Angeles—Although the needs of tank fabricators are off somewhat, plate demand has yet to feel anything like the easing experienced in other steel products.

Consolidated Western Steel Corp. is making substantial shipments for the Transcontinental Gasline, and recently resumed pipe shipments for the Saudi-Arabian oil line. This producer has in its backlog several other foreign pipe orders, requiring large plate tonnages. First shipment from Kaiser's Fontana plant on a French order for plates is expected late this month.

San Francisco—Plates are in tightest supply of all steel products, but in lighter gages demand is easing and supplies are slowly increasing. In heavy plates, however, the wide gap between supply and demand shows no signs of narrowing.

Seattle—Plates continue in short supply, handicapping shops in bidding for jobs involving large tonnages. There is a fair run of small tank and boiler jobs and shops are reasonably busy.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 138

Dallas—Demand for reinforcing bars continues active at prices off $4 as of Apr. 1. Large sizes are still in tight supply though ⅜ and ⅜-inch material remains fairly plentiful. Availability of the smaller sizes is attributed in part to a smaller demand than a year ago for residential construction. Total volume of busines is little changed as dealers and processors are finding the slightly slackened residential demand fully offset by an increase in activity in commercial construction.

Seattle—Buyers continue to press rolling mills for reinforcing bars,

particularly for small lots of less than 100 tons each. Drafting staffs are swamped with work. The reinforcing market appears to be headed for another record year, no recession being apparent yet. Fewer merchant bars are being rolled and the pre-war ratio between reinforcing and merchant has been restored, the former showing heavier volume.

Wire . . .

Wire Prices, Page 139

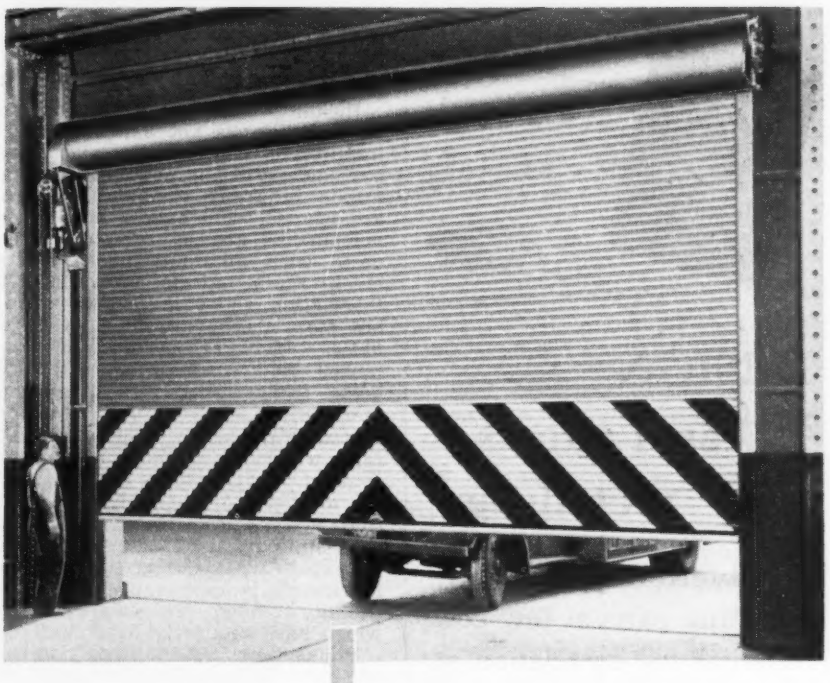
Pittsburgh—A moderate seasonal improvement in demand for merchant wire products is reported by number of producers, particularly for popular size housing nails and fence. Sellers are booked through second quarter on nails and fencing. Inventory adjustments continue to retard new demand for barbed wire. Similarly, requirements for high-carbon spring wire remain well below that recorded through most of last year, reflecting easing in needs of bedding and furniture manufacturers.

Galvanizing coating extras on nails were reduced $5 per ton by Jones & Laughlin and Bethlehem during March to levels quoted by other major interests of $2.80 per 100 pounds for 15 gage and coarser and $3.30 for finer than 15 gage. No further adjustment from these levels is reported to reflect recent reductions in zinc.

New York—Except for patented, annealed or processed wire, consumer allocations are withdrawn; quotas are meaningless for most common types of wire. Demand continues off with consumers drawing on inventory; in scattered instances, users cut back orders too deeply and are reinstating some volume to balance depleted stocks. There is also some holding back over prices, but revisions are limited to elimination of premiums thus far with no reduction in standard levels. Premium prices on nails are disappearing and at warehouse level some shading of normal quotations is being done.

Boston—Demand for wire and wire products entering into automobile production is holding better than for other major consuming industries, but buying is off slightly from recent peak. In other directions revival in orders is slow as users draw on inventories; mill backlogs are falling and deliveries improving. Some wire consumers aim for inventory levels below normal, depending on improved delivery to fill gaps as they appear. This trend is apparent with more users of heading wire. Improvement in rod supply continues.

Chicago—While merchant and manufacturers' wire demands have softened and several items are easily available, pressure is not entirely off producers for more tonnage. Presently, woven wire fence is in heavy demand as are steel posts, certain nail sizes and some spring types. Reinforcing mesh demand is also seasonally on the increase as new road repair programs get under way. Upholstery makers' requirements, however, have been curtailed for some time and bed makers' operations are also off substantially. Barbed wire presently is in free supply.



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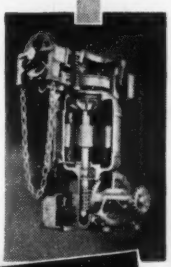
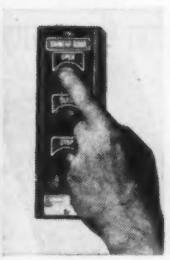
The rugged Kinnear Motor Operator shown at right can be added to any Kinnear Rolling Door for maximum speed, ease, and convenience of operation.





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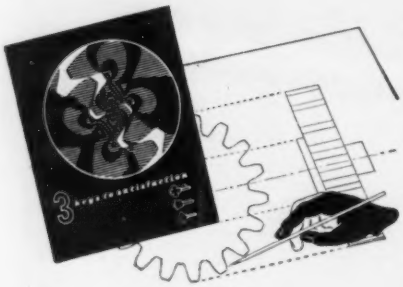

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Structural Shapes . . .

Structural Shape Prices, Page 139

Boston — Structural inquiry for public works is not balancing slack in private construction and usual seasonal upturn is not materializing. Public programs, including bridges, are delayed, while bulk of housing developments are of reinforced concrete with minimum of structural steel. Plain material is available to fabricating shops in larger volume, but most are buying on a job-to-job basis. More competitive situation marks bidding for limited tonnage being booked, resulting in slightly lower prices for fabricated steel.

New York—Structural activity is fair, with public work dominating demand. State bridges are coming in the market more actively and, while some are withdrawn because bids exceed appropriation, volume generally is expanding. Competition among fabricators is appreciably keener, especially among the smaller shops which have relatively light backlogs.

Philadelphia—Shape supply is rapidly coming into balance with demand, for not only is demand less active but more steel is available for the production of shapes. Shape capacity has seldom, if ever, been fully taxed. In normal peacetime, capacity has been usually well in excess of demand and in wartime and in such periods as experienced in recent years there has not been enough steel.

State bridge work dominates structural demand, with bids due in Apr. 29 on 15,000 tons for the Penrose Ave. bridge, this city; May 6, for a 4225-ton bridge project in Allegheny county.

Los Angeles—Deliveries are greatly improved in all structural categories, including wide flange beams which until recently were in tight supply. There is considerable demand for sheet piling, but in this case too, deliveries are better. Current requirements for sheet piling are substantial from Long Beach and San Diego harbors, Los Angeles river, a Mexican dam and power project. Building construction in southern California took an encouraging upswing during March, although it was comprised principally of small miscellaneous projects.

Seattle—Fabricators report that the run of small jobs is slowing, but plants have better than average backlogs. The supply situation is easing and deliveries from eastern producers have improved. Several sizable projects for Alaskan military installations are pending.

Tubular Goods . . .

Tubular Goods Prices, Page 139

Pittsburgh—National Tube Co. announced reduction of $2 per ton on galvanized pipe, effective Apr. 20, reflecting the 1-cent per pound decline in zinc on Apr. 19. Including the 1½-cent reduction in zinc quotation Mar. 23, total reduction through Apr. 19 amounted to 4½ cents and has resulted in automatic downward adjustment of $9 per ton in galvanized pipe prices. Wheeling Steel Corp. also announced similar reduction in pipe prices last week and

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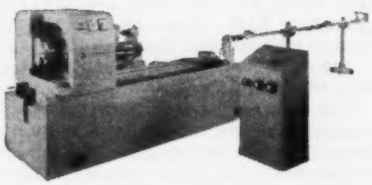
AND UNLOADS



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other leading producers were expected to follow by week-end.

Spang-Chalfant reduced galvanized pipe prices $2 per ton, effective Apr. 22, to reflect lower zinc prices.

Los Angeles—Requirements of the petroleum industry for pipe and equipment continue at a depressed level, with oil production and refining well below normal. The cutback in production is helping to deplete crude oil inventories, but stocks still are large. Several marginal oil fields operated by small independents have been temporarily shut down.

San Francisco — Availability of small pipe and tubing is improving steadily and supplies generally are ample for all demands.

Pig Iron . . .

Pig Iron Prices, Page 140

Pittsburgh—Further curtailment in foundry operations is noted. American Radiator & Standard Sanitary Corp. temporarily shut down its Pittsburgh Works last week, while other interests have reduced operating schedules to still lower levels. Within the past month nearly a dozen foundries have been forced to shutdown for brief periods due to lack of orders. Greater supply of cast scrap at nearly half the peak price levels has prompted some of the larger foundries to return to normal scrap-pig iron melting ratios. Lone merchant iron producer expects to accumulate some stock this month for the first time since prewar. An integrated producer has blown out two blast furnaces, reflecting lack of basic merchant iron demand.

New York—Pig iron prices continue to undergo adjustment, with leading Buffalo producers having reduced prices in line with competitive interests. Meanwhile, demand here continues spotty, with district foundries averaging not more than four days a week. This restricted melt, combined with high priced inventories, particularly those laid in from abroad, which various foundries are now working off, accounts for the continued lull in demand.

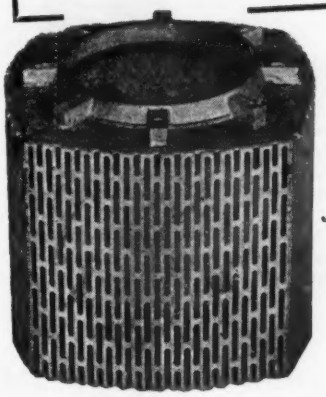
Far East Metals Corp., a San Francisco concern handling Austrian pig iron, is said to be low on the 60,000 tons of basic for Japan on which bids were opened by the Army Procurement Office in Chicago recently. The low price is said to be $55.75 c.i.f. Yokohama.

Boston—More pig iron is being offered by merchant and integrated furnaces without attracting buyers in volume. The district furnace is gradually building reserves and is offering tonnage out of this territory for the first time in many months. Additional basic tonnage is also offered with steelworks operations down slightly. Everett prices are probably established for this quarter.

Philadelphia — Pig iron demand continues spotty, with furnaces generally building up inventories. Foundries, with few exceptions, are operating at considerably reduced rates.

Cleveland — Reduced demand for pig iron is giving producers their first opportunity since prewar years to replenish stockpiles. Stockpiles enable sellers to fill orders for

Perforated Strainers and—



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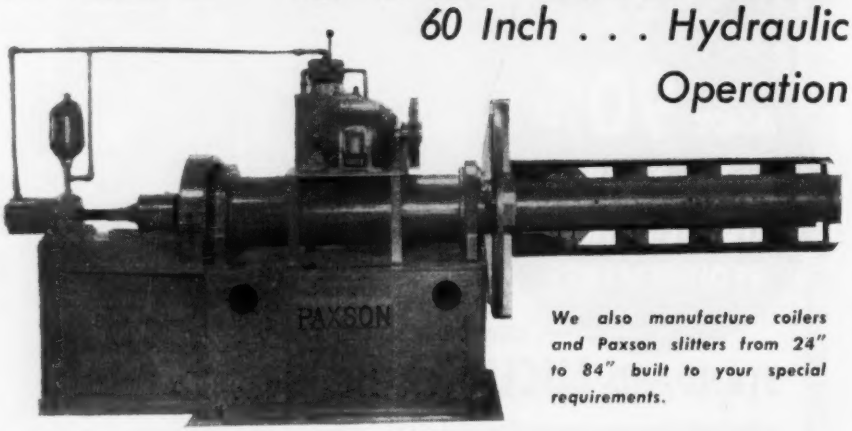

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specific analyses more quickly and also contribute to blast furnace operating economies by eliminating necessity for frequent switching of furnaces for one analysis to another.

Strongest source of demand for iron today is captive foundries, jobbing foundries having been hard hit by the business decline. Most consumers are continuing to reduce their inventories of iron.

Prices at Cleveland remain unchanged, although Republic Steel Corp. has followed Hanna Furnace Corp. and cut its merchant iron price at Buffalo $1 a ton on basic and 50c a ton on No. 2 foundry and malleable. This adjustment restores a 50-cent differential between basic and No. 2 foundry.

Buffalo—With competition among sellers again in evidence, Hanna Furnace announced the following price "adjustment" (f.o.b. furnace at Buffalo): Basic $46, down $1; No. 2 foundry $46.50, down 50 cents, and malleable $47, down 50 cents. Further signs that the pig iron market is moving toward easier tendencies were seen when an Erie, Pa., seller was quoting prices ranging 50 cents to $1 under Buffalo, prior to the reduction. Tonawanda Iron is slated to shutdown its blast furnace for an extensive rehabilitation job within the next ten days.

Cincinnati—Pig iron demand has declined further as foundries seek to hold stocks to a minimum. The district melt is at low level with jobbing and stove foundries especially hard hit by current dullness. Buyers of pig iron are displaying a price consciousness for the first time since the prewar days and are attempting to buy only from nearby furnaces.

St. Louis—Moderate customer pressure is being put on local pig iron producers for price reductions. Furnaces point out the recent $1 hike in iron ore boosted their costs $2, which they are absorbing, and therefore foresee no immediate price trimming. Low scrap prices are moderating pig demand somewhat, but demand nevertheless is so high ironmakers have not been able to approach the 15,000 to 30,000 tons of ground stocks they would like to accumulate.

Birmingham—While considerable of the pressure for pig iron has waned, pig iron supplies in the aggregate are still considerably behind demand. Soil pipe production is off somewhat, but insistence on the part of pressure pipe producers is still strong.

Iron Ore . . .

Iron Ore Prices, Page 140

Cleveland—Shipments of Lake Superior iron ore from upper lake ports so far this year are more than 2 million tons ahead of those for the like period a year ago, according to the Lake Superior Iron Ore Association, this city. The season's cumulative total to Apr. 18 was 5,169,761 tons compared with 3,142,838 tons a year ago.

During the week ended Apr. 18, shipments amounted to 1,842,813 tons compared with 2,071,577 tons for the preceding week and approximately the same tonnage for the like week a year ago

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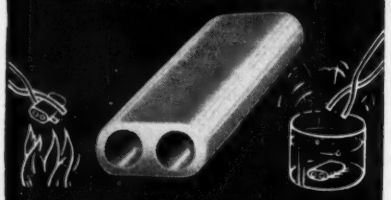
THERMOCOUPLE INSULATORS



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Ore Use at Peacetime High

Cleveland — Consumption of Lake Superior iron ore increased 742,335 tons last month to a new peacetime high of 7,734,760 tons, according to the Lake Superior Iron Ore Association, this city. The March total has been exceeded only in the wartime months of December, 1942, and January and October, 1943. This compared with 6,634,243 tons for March, 1948. Of last month's total, United States furnaces accounted for 7,481,789 tons.

The first quarter consumption amounted to 22,317,656 tons compared with 20,131,496 tons for the like period a year ago. As of Apr. 1, 177 furnaces were in blast and 8 were idle in the United States against 178 in blast and 7 idle a month earlier.

Stocks of Lake Superior iron ore totaled 17,308,374 tons as of Apr. 1 compared with 24,981,208 tons as of Mar. 1 and 16,022,253 tons as of Apr. 1, 1948.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 140

Pittsburgh — Sellers note little change in demand-supply relationship for either furnace or foundry coke. For some months demand for foundry coke has been in the doldrums and there is little indication of any improvement. Despite lethargy in foundry coke demand, prices have held firm. Possibility of a prolonged coal strike is expected to somewhat stimulate demand for coke over next few weeks.

Coke production capacity for United States Steel Corp's Pittsburgh district blast furnaces reached a new high last week when the first coke was pushed from a completely rebuilt battery of 61 by-product ovens at the Clairton Works. The new battery of ovens is expected to produce close to 325,000 tons of blast furnace coke annually.

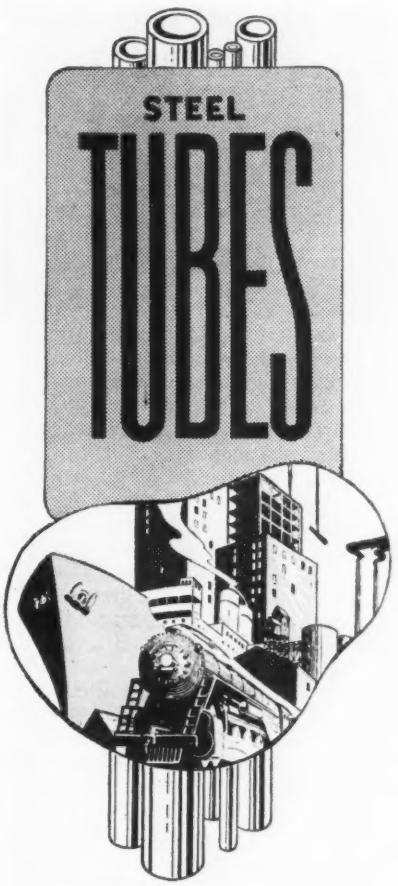
Cleveland—Lowered rate of foundry operations has reduced demand for coke. Deliveries are fairly prompt, and the quality is improved. Prices here remain unchanged, although an Indianapolis producer made a $1 cut last week, lowering the price at ovens there to $19.85.

Rails, Cars . . .

Track Material Prices, Page 139

New York—To help facilitate the flow of raw materials to steel mills, Pennsylvania Railroad has ordered 960 bulk containers and 200 new all-steel cabin cars, it was announced last week.

The bulk containers, each of 8 tons capacity, will be used for transporting lime, dolomite, ferromanganese and other steel constituents. The containers, in batteries of 12 mounted in specially equipped gondola cars, move directly to sidings within the steel mills, where they are handled by crane to the furnaces and emptied through bottom doors, which control the rate of flow. The use of these units by the steel mills eliminates rehandling, which, heretofore, was in many cases performed manually.



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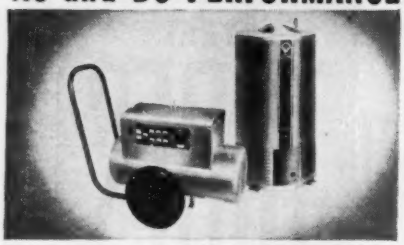
NEW ARC WELDERS BOOST AC and DC PERFORMANCE



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Full capacity, rugged duty DC arc welders are compact, light in weight—half the size and half the weight of older types—and are equipped with simplified current control, automatic electrode selector. Furnished in 150 to 400 amp. sets—motor driven, engine driven or belt drive.

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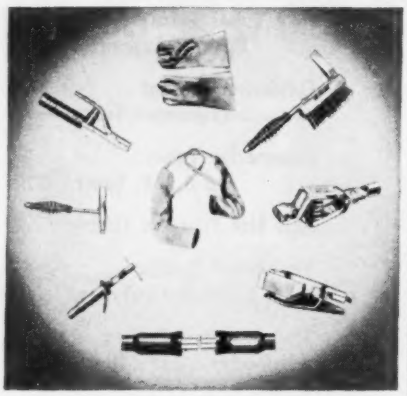
ACCESSORY DIVIDENDS DECLARED



UNDERSCORING the importance of proper accessories to top welding performance, more and more fabricators are taking pains with selection of accessories. Speedier, lower cost, safer and improved welding are assured when such items as helmets, shields, holders, connectors, cleaning tools and protective clothing are carefully selected. And more and more fabricators—sold on M & T electrode and arc welder performance — are specifying the M & T line of "accessories to the perfect weld." For descriptive literature, address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

Advertisement

Scrap . . .

Scrap Prices, Page 144

Pittsburgh—Some interests believe scrap consumers may enter the market more frequently to "prop" scrap prices at near current levels. Carrying out of this effort will depend largely on the future trend in steelmaking operations. Continued sharp cuts in scrap prices in the period preceding wage negotiations would add fuel to union's demands. There is little doubt that steel producers have been attempting to work off high-priced scrap before the anticipated drop in prices. Expected easing in steel production later this year and the resultant increase in pig iron supplies are additional factors influencing management decisions in respect to adequacy of scrap inventories. High ratio of pig iron in melting operations, plus steady influx of scrap from customers, has made it possible for leading mills to remain largely out of the market during the last few months. In recent weeks, some mills have turned down customers' scrap, notably turnings from the automotive industry.

Brokers offered some distress tonnages of No. 2 heavy melting in the $21 to $22 price range last week, but in the absence of a sale the market was quoted nominally at $23. Some low phos tonnage sold at $27; rails, 2 feet and under, at $36.

New York—Brokers have reduced their buying prices on No. 1 heavy melting steel and No. 1 bundles to $16-$17, f.o.b. shipping point. No. 2 melting steel and No. 1 busheling are off slightly to $14-$14.50 and No. 2 bundles to $14.50. Punching and plate scrap and electric furnace bundles are lower at $16.50-$17.50. Machine shop turnings and mixed borings and turnings, on the other hand, are up slightly to a spread of $5-$7 and short shovel turnings to $8-$9. Cast grades are unchanged, with the situation in general still dull.

Boston—As scrap prices continue to weaken, but at slower pace, relatively few consumers are in position to take advantage of lower quotations which accounts for inactivity; this is especially true of cast where inventories of high-cost tonnage are substantial for current melt. Decline in steel scrap is most pronounced in borings and turnings and short shoveling turnings. Lack of buying makes quotations for both steel and cast more or less nominal.

Detroit—Appearance of large automotive lists this week for bids on the free market will determine the short-term price trend. It is expected to hold at about the present level or a trifle lower. Brokers look for a little more firmness some time between May 1 and June 1 when a resumption of mill buying on a larger scale is anticipated. One of the largest body manufacturers is understood to have something like 26,000 tons of bundles to offer, indicating the feverish production pace in this unit's plants, some of which are working six days weekly. No. 1 bundles and electric furnace plate scrap are off $1 to $19.00-$20.00 on basis of sales to an electric furnace-melter. Fragmentary buying is confined to only the choicest grades of material. Ford reportedly is selling an accumulation of low-phos electric furnace scrap for less than one-third the price paid for it originally. Meanwhile, ingots continue to be piled at the Rouge plant awaiting availability of slabbing facilities. One estimate is that close to $100 million worth of steel is represented in this inventory.

Philadelphia—No. 1 heavy melting steel scrap has undergone a further decline to $22.50-$23 delivered. No. 2 heavy melting and No. 1 busheling have eased to $20. No. 1 bundles, electric furnace bundles and heavy turnings are now holding at $22.50-$23 and No. 2 bundles at $18. Machine shop turnings and mixed borings and turnings and short shovel turnings and low phos grades are nominally unchanged, but weak.

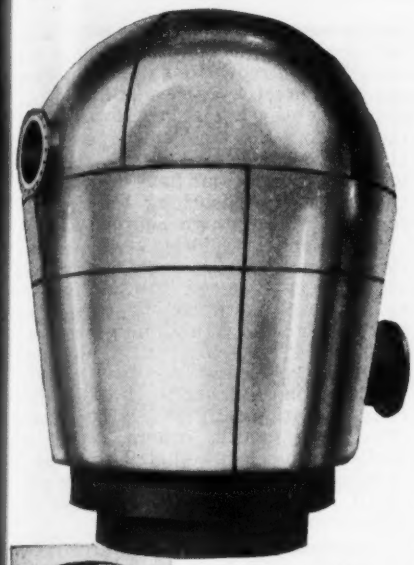
Cast scrap prices are unchanged, but with the undertone somewhat stronger. Steel mill cast is in better demand by consumers in view of the attractiveness of prices as compared with those for pig iron. Some sellers believe the cast market is virtually at the bottom unless there are substantial reductions in the current minimum prices for iron.

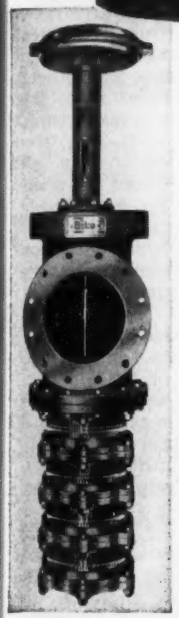
Chicago—Results of too sharp a price decline are starting to show up in the scrap market. Supply of No. 2 heavy melting steel from remote areas is beginning to dry up, freight charges, commissions and handling costs being too great to provide an adequate profit margin for collectors. This tendency has not become as pronounced among local dealers yet, principally because freight is not as important an item in the total cost, but the danger signals are flying and evidence that these are getting some recognition is found front the latest prices paid by a major mill for dealer heavy melting and dealer bundled scrap. Bought at $22 and $20, respectively, the scrap could have been acquired for substantially less, indicating that at least this mill regards the decline as having proceeded as far as it can with safety. Weakness in railroad items apparently has not reached its maximum and the roads in some cases have been willing to settle for less than the normal premium differentials over industrial material.

Buffalo—Scrap prices continued to nosedive last week. Despite the almost total absence of new sales, price breaks were generally considered to be of more than a mere nominal nature as dealers expressed a willingness to do business at the lower price ranges.

Offerings of No. 2 heavy melting and related steelmaking grades were available within the range of $20-$21, off $1 to $1.50 from the previous week, but there were no takers. Blast furnace items also extended the skid, with machine shop turnings tumbling to $14-$15. A boatload of approximately 2000 tons of blast scrap arrived from Detroit, while another boat with 5000 tons of steelmaking material also arrived via the lakes. Considerable tonnage of scrap from the eastern seaboard, due to arrive via the Barge canal, is held up because of high water.

Cleveland—Scrap market here remains dull and weak. Although consumers as a whole are out of the





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PROCESSES FOR REMOVAL OF WATER IMPURITIES

market, some are taking advantage of the lower prices and buying distress lots. With prices on the downtrend, dealers are reluctant to build up stocks, with a result that if the big steel mills came back into the market at once the price on heavy melting steel scrap would shoot up to $30 from the present nominal price of around $20, according to one broker. However, steel mills are still comfortably stocked with scrap. One big consumer indicated it would not come back into the market even in May.

Cincinnati—Weakness in the scrap market has not been halted. Prices for steelmaking grades were off modestly, following more drastic cuts in recent weeks. Foundry grades were especially dull, and cuts most pronounced. Scrap melters were avoiding supplements to inventory; in fact, they were intent on cutting scrap stocks. All purchasing was in minor tonnages.

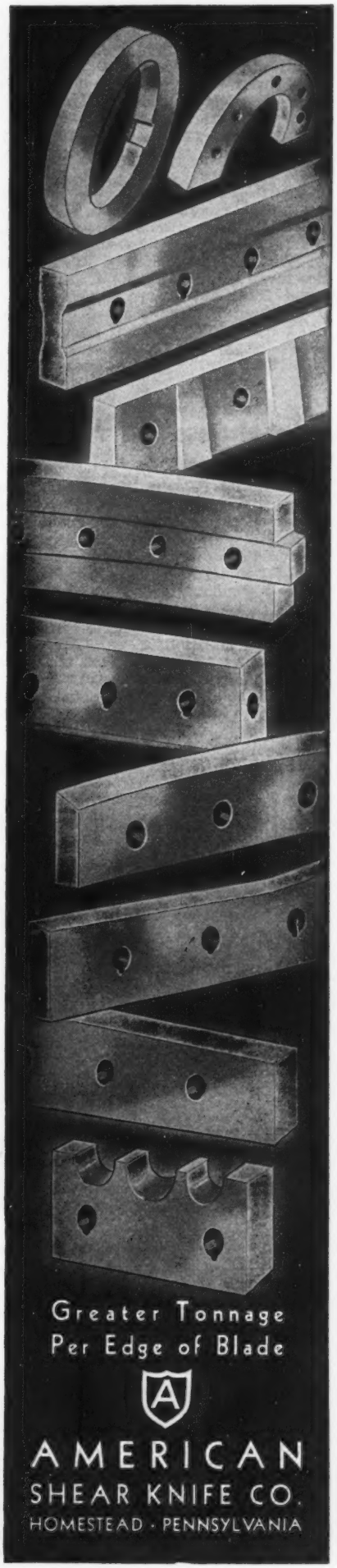
Birmingham—Scrap, reversing the trend of earlier months, still shows progressive weakness with heavy melting last week down to $22, the lowest point in many months. For the first time in months, prime scrap grades are below pig iron prices, with the result that speculation is heard locally of possible pig iron price reductions. No word to that effect has come yet from official quarters.

Dallas—There is no change in the local scrap situation. Prices remain nominal, with busines at too low an ebb to make a market. Dealers generally in this area are not taking advantage of the low prices to build up inventories, apparently preferring to wait the situation out. Dealers in the southwest area say they are in a particularly disadvantageous situation because of remoteness from most mills.

St. Louis—Dealers' buying prices on scrap slipped $1 to $2 again last week. No. 1 and No. 2 heavy melting steel was quoted $23 and $20, respectively, with mill purchasing agents remarking: "We'd be afraid to offer $2 under that unless we were prepared to have it accepted." The $20 price was established on a 1500-ton "courtesy" purchase. There have been no substantial deals for nearly two months. Brokers foresee none in the near future and, therefore, remain bearish on the scrap outlook. Mills are showing little interest in railroad metal while practically no market exists for cast grades. Mill and foundry reserves are 60 days or more, and better than average shipments on old orders are allowing them to keep abreast of the daily melt.

Los Angeles—Price structure of the scrap market is soft, and there are indications that the decline may not have halted for long. Most of the material currently being received in this district is coming from industrial, government, and wrecking sources. Collections by small dealers have virtually ceased, for price reasons. Several mills have substantial commitments for foreign scrap, but the flow of this material has been slowed. Suppliers are reworking much of it to meet mill specifications.

San Francisco—Possibility of another reduction in West Coast scrap prices May 1 is indicated by plenti-



UNIVERSITY OF MICHIGAN LIBRARIES

ful offerings being tendered to mills since reductions were made Apr. 1. Mill buyers, however, have been virtually out of the market during the last three weeks, buying on only a limited, selective scale. All are well supplied with material, and none shows a tendency to return to heavy scale domestic scrap buying any time soon.

Seattle—Steel scrap market has stabilized at $22 for No. 1 heavy melting, other items in proportion. At this level, receipts are in excess of consumption and mills are adding to inventories. Additional full cargoes from Japan are expected by Bethlehem Pacific Coast Steel Corp. Withdrawal of Isaacson Iron Works and Pacific Car & Foundry Co., Seattle, from the market has diverted larger tonnages to the mills.

Warehouse . . .

Warehouse Prices, Page 141

Chicago — Overly simplified, the warehouse inventory-inquiry picture breaks down into two distinct views: (1) The small, independent distributor whose stocks now are reasonably well balanced, demand having dropped substantially; and (2) the large warehouse, whose stocks of major products are still insufficient. The little distributor, catering mainly to small machine shops, stampers and fabricators, is reflecting the depressed condition of its customers; the larger interest has a broader customer base with heavier individual orders and its customers generally are operating at satisfactorily high levels. Too, many of these distributors have single mill affiliations and have not been able to build up stocks from ex-quota offerings elsewhere. Steel offerings from two directions have been increasingly noted by warehousemen—consumers who found themselves inventory-heavy on basis of lower production schedules, and from mills.

New York — With demand lower mill shipments to warehouses are heavier, reversing a situation prevailing since before the war. Warehouse stocks are getting into balance on some products and are beyond that on some. This is forcing cancellations, including hot-rolled carbon bar tonnage. Bars and plates are moving slower while structurals are adversely affected by offerings of foreign tonnage at lower prices. Mill buyers who for long have depended on warehouses for part tonnage requirements are returning to primary producers for bulk of needs.

Pittsburgh—Further downward adjustment in warehouse price base for galvanized sheets is indicated to reflect decline in zinc quotations on Apr. 14 and again last week. Earlier this month steel distributors had reduced galvanized sheet prices $2 per ton on No. 10 gage as result of previous drop in zinc prices. Jobbers handling galvanized pipe prices have altered quotations in line with reduction in mill quotations, although, as in case of galvanized sheets, pipe prices were not revised up until late last week to reflect latest decline in zinc. Recent reductions in black pipe put into effect by Jones & Laughlin, also have been reflected in lower quotations for this company's products. U. S. Steel Supply Co. has reduced its price on some bar flats to competitive levels by absorbing the freight from its Youngstown source.

Philadelphia—Jobbers are expecting to announce shortly further revision in galvanized product prices as a result of added declines in zinc. The price situation, otherwise, is stable at the moment. Meanwhile, demand continues to taper off. While some jobbers note little change in the daily rate of business from last month, others report a decline. One large distributor estimates that his business will be off about 15 per cent, on the basis of experience to date.

Cleveland—Demand on warehouses is spotty, some reporting continued good business, some experiencing an upturn from low levels, and others indicating no improvement from the reduced pace of the last three months.

Warehouse prices on nearly all products have been reduced $4 to $6 a ton from recent levels. Alloys have not been cut but warehouses are expecting a mill price reduction soon that would permit a lowering of warehouse quotations. Demand for alloy has weakened.

An indication of increased competition among warehouses for business is the disappearance of price variations, the new prices as a whole reflecting an effort to meet the lowest quoted price. Increased availability of steel from nearby mills and a resultant lower cost of freight has aided warehouses in lowering prices.

Cincinnati—Sales of warehouse steel are holding up well. Orders are more numerous and individually lighter than in recent months, the latter due to withdrawal of many normal mill customers. Stocks are improved, although beams and plates are still scarce items. Some price adjustments, in addition to those on galvanized items which were affected by the cut in zinc, appear imminent.

Dallas—Dallas warehousemen report supplies generally continue to loosen up, though some buyer resistance has been encountered. Demand on the whole remains reasonably good, however. About the only items that remain in tight supply are small size angles and 15 and 16-gage sheet.

San Francisco—Jobbers who did a third to a half less business in the first quarter this year than in the 1948 period find little optimism in current trends. Demand from consumers still is spotty and designed to fill only immediate needs. Jobbers in turn are placing orders with mills just as selectively for fear of overloading inventories.

Seattle — Jobbing houses report limited receipts of sheets which continue in critical supply. Both galvanized and hot-rolled sheets are in strong demand and it is difficult to fill orders under existing allocations. Alloys are much easier; plates, ½-inch and under, are extremely short; ⅝-inch and up are somewhat easier.

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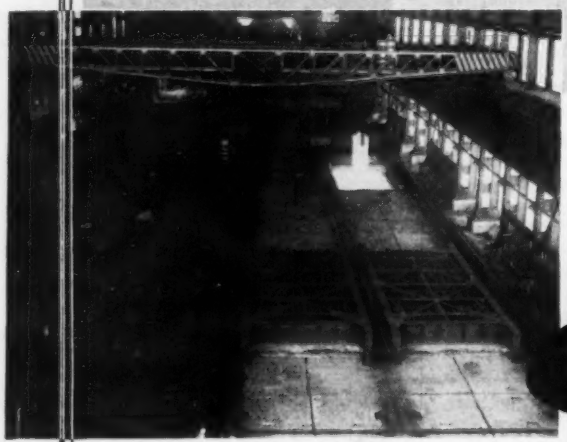

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Coal Operators Give Notice

SOUTHERN Coal Producers Association, representing 30 per cent of soft coal production, last week advised John L. Lewis they want to terminate their wage agreement with the United Mine Workers on June 30, and asked that a new wage conference be convened. Strategy of the operators in taking the initiative to call for wage talks was not immediately apparent. Usually, the miners' wage agreements have been terminated by Mr. Lewis.

Canada . . .

Toronto, Ont.—Production of primary iron and steel shapes in Canada during January totaled 321,337 net tons against 300,585 in December and 290,840 in January, 1948. For January this year, output included 313,660 tons of carbon and 7677 tons of alloy steel shapes.

Shipments for sale in January included 8214 tons of semifinished; 17,265 tons of structurals; 19,484 tons of plates; 33,200 tons of rails; 5764 tons of tie plate and track material; 54,635 tons of hot-rolled bars; 13,219 tons of pipe and tubes; 25,540 tons of wire rods; 18,419 tons of black sheets; 7722 tons of galvanized sheets; 8328 tons of castings; 5321 tons of miscellaneous hot-rolled products and 16,437 tons of all other products.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PENDING

9100 tons, Port Authority bus terminal, between Eighth and Ninth Aves. and 40th and 41st Sts., Manhattan, New York; Harris Structural Steel Co., that city, low bidder.

4225 tons, state bridge work, Allegheny county, Pennsylvania, bids May 6; this project will also require 335 tons of reinforcing steel and 46,481 square feet of 4¼-inch steel beam bridge flooring.

425 tons, addition, public school No. 81, Bronx, New York; bids Apr. 26.

410 tons, addition, printing plant, New York Mirror Division of Hearst Publications, 540 Atlantic Ave., Brooklyn, N. Y.; bids Apr. 26.

225 tons, turbo-generator foundations, power house, Edgemoor, Del.; pending.

220 tons, state bridge work, Warren county, bids May 6.

150 tons, bus garage, Board of Transportation, Jamaica, Long Island; bids Apr. 29.

125 tons, Maryland state bridge over Chop Tank river; bids Apr. 26.

100 tons, addition, public school No. 14, Bronx, New York; bids May 4.

100 tons, sulphite and water disposal plant, Scott Paper Co., Chester, Pa.; pending.

Unstated, plant addition, Owens-Illinois Glass Co., Bridgeton, N. J.; bids Apr. 27.

Unstated, ring seat gates and other items, Coulee power plant; bids to Bureau of Reclamation, Denver, about Apr. 21.

REINFORCING BARS . . .

REINFORCING BARS PENDING

335 tons, bridge work, Allegheny county, Pennsylvania, bids May 6.

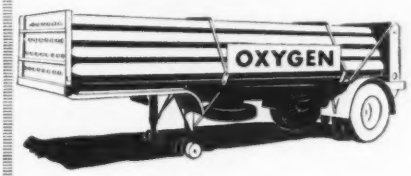
151 tons, state bridge work, Middlesex county, New Jersey, bids Apr. 28; this project, as reported last week, will also require 752 tons of structural steel.

PLATES . . .

PLATES PENDING

100 tons, Corps of Engineers, Vicksburg, Miss.; also 38 tons of angles and channels.

WHO PAYS THE FREIGHT?



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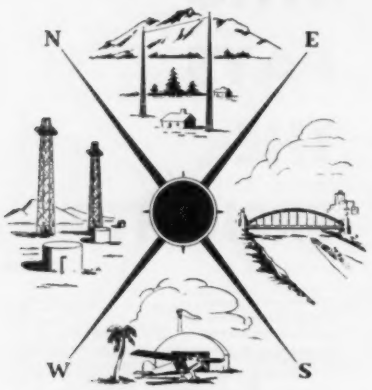

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CONSTRUCTION AND ENTERPRISE

ALABAMA

BIRMINGHAM — Standard Casket Mfg. Co. has awarded a $439,000 contract to Brice Building Co., 1021 Second Ave. N., for manufacturing buildings; Miller, Martin & Lewis, Title Guarantee Bldg., architect.

COLORADO

TACOMA, COLO. — Western Colorado Power Co., Durango, Colo., has awarded a $450,000 contract to Ellis W. Barker Co., 302-393 Ness Bldg., Salt Lake City, Utah, for enlarging power plant facilities.

DISTRICT OF COLUMBIA

WASHINGTON—Abbott Merkt & Co., architect, 10 E. 40th St., New York, will let a $450,000 contract for laboratory and office for National Canners Association, 18th and H Sts. N. W.

WASHINGTON—Washington Post Newspaper Co., 1337 E. St. N. W., has awarded a $1 million contract to John J. McShin Inc., Arlington, Va., for a newspaper plant.

FLORIDA

MIAMI, FLA.—Miami Fish Producers Exchange Inc., c/o George D. Moffat, engineer, 1764 N. W. North River Dr., has awarded a $300,000 contract to L. L. Jackson, 1760 W. Flagler St., for construction of a warehouse.

GEORGIA

CHAMBLEE, GA.—John Deere Plow Co., c/o contractor, has awarded a $1 million contract to Henry C. Beck Co., First National Bank Bldg., Atlanta, for construction of a warehouse and office.

THOMASVILLE, GA.—Georgia Packing Co. has awarded a $100,000 contract to H. & H. Construction & Supply Co. for construction of a freezer and shipping plant.

ILLINOIS

BELLEVILLE, ILL.—City of Belleville has awarded contracts for a sewage treatment plant, additions and improvements, including auxiliaries and appurtenances under bids received Apr. 8, as follows: General work to Bauer Construction Co., 424 Lebanon Ave., $639,148; mechanical equipment to Rust Contracting & Supply Co., 722 N. 10th St., $383,434; and electric work to Phillips Electric & Supply Co., 217 E. Main St., at $18,200. Russell & Axon, Suite 203, 408 Olive St., St. Louis, consulting engineer.

CHICAGO—Commonwealth Edison Co., 72 W. Adams St., has awarded a $210,000 contract to Paschen Contractors Inc., 2739 Elston St., for construction of a sub-station, 2350 Narragansett St.; Holabird, Root & Burgee, 180 N. Wabash St., architect.

ELGIN, ILL.—Illinois Tool Works, 1001 Grace St., has received a $375,000 bid from Charles E. Giertz & Son, 57 N. Douglas St., for a factory.

HENNEPIN, ILL.—Illinois Power Co. contemplates erection of a $10 million power generating plant.

IOWA

DAVENPORT, IOWA—Englehart Mfg. Co., 107 Scott St., has awarded a $125,000 general contract to John H. Soller Construction Co., 717 Harrison St., for construction of a factory.

MASSACHUSETTS

SALEM, MASS.—Salem Electric Lighting Co., 441 Stuart St., Boston, has awarded separate contracts for a $10 million electric generating plant; United Engineers & Constructors Inc., 1401 Arch St., Philadelphia, engineer.

MICHIGAN

ALBION, MICH.—Albion Malleable Iron Co. has purchased from the WAA for $350,000 a surplus, government-owned steel casting facility, which it has operated under lease since the end of the war. Purchaser plans to spend $450,000 in altering and replacing old equipment.

DETROIT—Allied Products Corp., 4560 Lawton Ave., has awarded an $850,000 contract to Austin Co. at Detroit, for an office and manufacturing building.

GRAND RAPIDS, MICH. — Doehler-Jarvis Corp., New York, plans to build a $1 million die-casting plant.

LANSING, MICH.—Bids will be taken for construction of a $1 million newspaper plant; Morton L. Pereira & Associates, Chicago, engineer and architect.

PETERSBURG, MICH.—Walter Anicka, Ann Arbor, Mich., architect, is preparing plans for a school building.

MINNESOTA

MINNEAPOLIS — Newhouse Paper Co., 515 Washington Ave. N., has awarded a $68,000 contract to W. A. South Co., 120 S. 10th St., for construction of a warehouse; E. J. Becchetti, 125 S. 10th St., architect.

NEW HAMPSHIRE

MANCHESTER, N. H.—United States Engineer, Army Base, Boston, has awarded a $532,216 contract to Davison Construction Co., 1306-A Elm St., for a boiler house, garage and personnel quarters for a Veterans Administration hospital, for Veterans Administration, Vermont Ave., between H & I Sts. N.W., Washington.

NEW YORK

SYRACUSE, N. Y.—Department of Parks, City Hall, has awarded a $122,500 general contract to Louis Gressani Construction Co. Inc., Hopkins & Liverpool Rds., for an airport building at Clarence E. Hancock Airport.

NORTH CAROLINA

BURLINGTON, N. C. — Piedmont Heights Plants, c/o contractor, has awarded a $300,000 contract to H. L. Coble Construction Co., Greensboro, N. C., for construction of a plant.

WINSTON-SALEM, N. C.—Macklin & Stinson, architect and engineer, 226 Trade St., will build a warehouse addition for Atlas Supply Co., 236 Liberty St.

OHIO

AKRON—B. F. Goodrich Co., 500 S. Main St., has awarded a $1 million contract to Hughes-Foulkrod Co., 1505 Race St., Philadelphia, for construction of a factory.

CINCINNATI—Contracts have been awarded for a building to house facilities for generating more steam for Factory Power Co., Marburg Ave.

CLEVELAND—J. H. Holan Corp., 4150 W. 150th St., will go into production on a new hydraulic tower which will be used by utilities for servicing street lights.

CLEVELAND—National Concrete Fireproofing Co., Terminal Tower, has been awarded a $3 million contract to build a series of 20 giant television relay towers that will add new Ohio cities to the nation-wide television network.

CLEVELAND—Hupp Corp., 1250 W. 76th St., is expanding its lines at both Cleveland and Chicago and plans to dispose of its Detroit plant, which has been engaged in contract machining. Funds from the sale will be applied toward expanding operations at other locations. At the Cleveland plant additional products will be made for the automotive and refrigeration industries, while at Chicago the gear-producing plant will add transmission drives to its output. General offices will be at Cleveland.

OREGON

PORTLAND, OREG.—Bids will be opened Apr. 28 for Federal Reserve Bank branch, 4-story steel frame, estimated at $2.5 million, vault to be installed in basement; Pietro Belluschi, architect.

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Maximum penetration into scrap assures capacity grabs which are held and lifted in an inescapable grasp.

Independent action permits entire closing power to be concentrated on one tine or distributed among tines where it is most effective. Write for the catalog.

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Oliver Building, Pittsburgh, Penna.

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VERTICAL DRIVES?

OR SHAFT DOWN

DE LAVAL VERTICAL DRIVE REDUCERS

A complete line of De Laval vertical speed reducers, in both single and double reductions, is available for driving agitators, mixers, and many other types of vertical shaft equipment.

If vertical drives are your problem, consult De Laval.

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WG-16

Worm Gear Division

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De Laval Steam Turbine Co., Trenton 2, N. J.

TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS • CENTRIFUGAL PUMPS
CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

UNIVERSITY OF MICHIGAN LIBRARIES

PENNSYLVANIA

ALTOONA, PA.—Altoona Enterprises Inc., Commerce Bldg., has awarded a $200,000 contract to J. C. Orr & Son, Seventh Ave. and Fifth St., for erection of a manufacturing building. Blair Shirt Corp., 14 Logan Blvd., lessee; Hunter, Caldwell & Campbell, 3801 Fifth Ave., architect.

BESSEMER, PA.—Bessemer Limestone & Cement Co. has built a new plant to neutralize waste pickle liquors. It handles waste acid disposal for a group of Shenango and Beaver Valley, Pa., steel firms.

DU BOIS, PA.—Pittsburgh Du Bois Co., division of Rockwell Mfg. Corp., 689 Liberty Blvd., has awarded a $100,000 contract to Bert C. Skinner, 209 Washington Ave., for construction of a plant.

PHILADELPHIA—Baltimore & Ohio Railroad, A. C. Clarke, chief engineer, Baltimore & Charles Sts., Baltimore, has awarded a $250,000 contract to Hauser Construction Co. for rebuilding engine house.

WEST MIFFLIN, PA.—General Motors Corp., Fisher Body Division, Detroit, has awarded contracts for a stamping plant as follows: Plumbing to Sauer Inc., 2701 East St., Pittsburgh; roof deck and windows to Detroit Steel Products Co., 434 Melwood Ave., Pittsburgh; Ragner-Benson Corp., Chicago, general contractor, and Argonaut Realty Co., 310 Research Bldg., Detroit, engineer and architect.

TENNESSEE

TIPTONVILLE, TENN.—Federal Compress & Warehouse Co., c/o contractor, has awarded a $150,000 contract to W. W. Yarbrough, 119 Adams Ave., Memphis, Tenn., for a warehouse.

TEXAS

DALLAS—Dallas Tailor & Laundry Supply Co., 411 S. Akard St., has awarded a $115,824 contract to Bock Construction Co., 2626 Ferris St., for a warehouse; Max M. Sandfield, 2907 Maple Ave., engineer.

HOUSTON—National Steel Co. Division received bids Apr. 18 in office of Weirton Steel Products Co., Weirton, W. Va., for warehouse, office and plant building on Houston ship channel; C. J. Klein, chief engineer, David M. Duller, consulting engineer.

PORT NECHES, TEX.—B. F. Goodrich Co., 500 S. Main St., Akron, has awarded a $750,000 contract to Carruth Contracting Co., c/o A. E. Dishman, 5795 Port Arthur Rd., Beaumont, Tex., for construction of a plant.

SAN ANTONIO, TEX.—City Public Service Board, 201 N. St. Marys St., will spend $200,000 on gas line laterals and mains expansions in old districts; $275,000 in electric transmission line improvements and replacements in various sections of city.

TEXAS CITY, TEX.—Carbide & Carbon Chemical Corp. has awarded a $600,000 contract to Ford, Bacon & Davis, for construction of a plant.

WASHINGTON

ANACORTES, WASH.—Preliminary work has begun on proposed reduction plant for American Chrome & Magnesium Industries; plans include a road into the Twin Sisters area for transportation of ore.

SEATTLE—Bids involving several million dollars for military installations in Alaska, units of the $65 million expansion program for the territory, have been opened. Low bids and awards for the several jobs include: Outside utilities Elelson air force base, Selid Construction Co., $497,448; airfield lighting, same base, Reed & Martin, $703,000 (awarded); outside facilities, same base, Fred Wagar, Auburn, Wash., $509,500; outside facilities, Ladd field, B. & M. Construction Co., $1,997,500; power plant Ladd field.

SPOKANE, WASH.—Centennial Milling Co. has awarded a $204,000 contract to Henry George & Sons for additional grain storage at local plant involving 40 concrete storage bins.

WISCONSIN

MILWAUKEE—Morley-Murphy Co., 434 N. Plankington Ave., will award a $250,000 contract to Charles Maier & Son Co., 1633 N. 30th St., for construction of a ware-

CANADA

ABBOTSFORD AND KILGARD, B. C.—Clayburn Co. Ltd., 850 W. Hastings St., Vancouver, has awarded $800,000 in a contract for a plant at Abbotsford, and in reconstruction of a plant at Kilgard; owner builds. Swan, Rhodes & Wooster, 718 Granville St., Vancouver, engineer.

LONDON, ONT.—General Steel Wares, 199 River St., Toronto, Ont., has awarded a $500,000 contract to Putherbough Construction Co., 320 Colborne St., for construction of a foundry; O. Roy Moore, 260½ Dundas St., architect.

BUCKINGHAM, QUE.—Reduction Co. of Canada Ltd., 7 Short St., has awarded a $100,000 contract to S. D. Miller & Son, 6999 Cote des Neiges Rd., Montreal, Que., for construction of a factory.

MONTREAL, QUE.—Canadian Electric Supplies Ltd., 285 Craig St., has awarded a $115,000 contract to Anglin Norcross Quebec Ltd., 892 Sherbrooke St. W.; G. D. Thompson, 1241 Guy St., architect.

MONTREAL, QUE. — MacFarlane LeFaivre Ltd., 1680 Papineau Ave., has awarded a $100,000 contract to Grenon Construction Co. Ltd., 5460 Park Ave., for a factory; P. Paquette, 5468 Park Ave., architect.

MONTREAL, QUE.—Northern Electric Co. Ltd., 1600 Notre Dame St., has awarded a $150,000 contract to Foundation Co. of Canada Ltd., 1900 W. Sherbrooke St., for construction of a plant, Rockfield Ave.; J. D. Despatie, chief engineer.

SHAWINIGAN FALLS, QUE.—Canadian Industries Ltd., 1135 Beaver Hall Hill, Montreal, Que., has awarded a $4 million contract to Fraser Brace Engineering Co. Ltd., 360 St. James St., Montreal, for construction of a plant, Cloutier St.; Irving R. Tait, chief engineer.

THETFORD MINES, QUE.—United Asbestos Corp. has awarded a $200,000 contract for shaft sinking and development on shores along Black Lake, owner builds; C. H. Shoemaker, c/o owner, engineer.

PRICES OF LEADING FERROALLOY PRODUCTS

(*Continued from Page* 141)

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots, 2" x D, $1.40 per lb of contained Ti; less ton $1.45, (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot $1.28, less ton $1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract, $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

VANADIUM ALLOYS

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb of contained V_2O_5, freight allowed. Spot, add 5c.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Contract, 10,000 lb W. or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W., $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max, C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed. ½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.